

JPRS-UEA-90-025  
2 AUGUST 1990



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# ***JPRS Report***

## **Soviet Union**

***Economic Affairs***  
**Special Transportation Issue**

**DISTRIBUTION STATEMENT A**  
Approved for Public Release  
Distribution Unlimited

19991028 134

**DTIC QUALITY INSPECTED 8**

# Soviet Union

## Economic Affairs

### Special Transportation Issue

JPRS-UEA-90-025

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## CIVIL AVIATION

### New Civil Aviation Minister Interviewed

904H0206A Moscow PRAVITELSTVENNYY  
VESTNIK in Russian No 19, May 90 pp 8-9

[Interview with B. Ye. Panyukov, minister of civil aviation, by A. Khodyrev: "Boris Yegorovich Panyukov, the USSR Minister of Civil Aviation"]

[Text] **Biography:** Russian, born 1930. CPSU member. Began work in 1950 as an aviation technician. Worked as deputy chief and chief of Mineralnyye Vody Airport. Chief of Vnukovo Airport and commander of Vnukovo Unified Aviation Detachment since 1970. Later, chief of the Transport and Commercial Operations Administration, MGA [Ministry of Civil Aviation]. Appointed deputy minister in 1979 and first deputy minister of civil aviation in 1982.

[Khodyrev] Boris Yegorovich, as one who is not a pilot, how do you assess your new position in management of "the flying sector?"

[Panyukov] No, I am not a pilot. But an aircraft cannot climb into the sky without "the land," as they say. We must guarantee flight safety, which is provided for to a large extent by the ground services. But the minister is not called upon to teach a pilot to fly or a controller to control air traffic, you know—a special system for training personnel and improving their skill has been developed in our sector for this. Moreover, the deputy minister for organizing flying activity is concerned with purely professional matters.

As far as I am concerned, I have become familiar with flying activity in practice, and I am accustomed to appreciating the capabilities and talent of a great many flight specialists, the overwhelming majority of whom I know personally. My hope and confidence in the success of our common effort lies with them.

And this is what I want to speak about. Many years of production work and in the ministry organization have shaped my firm convictions: the sector's manager must have in-depth knowledge of the human factor in all its manifestations and the ability to apply the principles of production organization in practice, and he must have mastered economic management methods and the art of working with people. There are many more than these items, of course—after all, there are numerous situations, many of them unpredictable, interwoven in the minister's work day, and he must examine the details of each one of them and make the best decision.

[Khodyrev] You worked for almost eight years as a deputy minister, even the first deputy minister. Now you have the lead role. What policy will you be implementing, and what are the problems of top priority for you in the present stage?

[Panyukov] I will say this: I consider myself simply committed to reaffirm my devotion to the best traditions of Aeroflot, first of all. The patriotism, internationalism, friendship, solidarity, and discipline which the honor of an aviator personifies, on the whole, have always been characteristic of civil aviators. Developing and augmenting these qualities and maintaining their continuity—this is what I see as my direct responsibility as a minister, a communist, and a member of Aeroflot.

But if you are speaking about the fundamental problems which we will have to resolve, we formulated them at a recent session of the sector council. They have all been subordinated to the essence and spirit of perestroika. This refers to the three interrelated concepts in civil aviation's development which cover all our many and diverse problems.

[Khodyrev] Can you cite them specifically?

[Panyukov] Certainly. The first one defines the development of the fleet of aircraft for the purpose of meeting passenger demand and ensuring flight safety. We attach no less importance to the concept of developing the air traffic control system. And finally, the two preceding concepts are amplified by development of the material and technical base and the sector's social sphere. So our strategy and tactics in the difficult process of perestroika are based on these three foundations.

[Khodyrev] The sector council is something new in Aeroflot. Tell us about it in a little more detail.

[Panyukov] The creation of our council was the natural result of the process of democratizing the sector's management. This is confirmed by the very fact that it was formed. At first, enterprises from localities made suggestions on the standards for representation in the council, and after that the basic objectives and tasks in its activity were defined more precisely. Now any fundamental question of sectorial importance can be submitted for the council's consideration. Its opinion is also taken into account in selecting and assigning supervisory personnel. In a word, we are pinning great hopes on this influential new organ in resolving the most critical current and long-term problems.

[Khodyrev] It is common knowledge that one of these problems is the social problem. What specific steps are being taken by the ministry, and now the sector council as well, to resolve it?

[Panyukov] I will say frankly: this is a very difficult problem. It is a chronic illness and it cannot be concealed that it has not been cured to this day. Judge for yourself. Housing provided for aviators is 80 percent of the norm, cultural facilities make up 67 percent of the norm, and there are even less hospitals—40 percent of the norm.

I realize that establishing the facts is not resolving the problem. But we are not contemplating this situation indifferently; we are looking for opportunities to change it for the better. And there has been progress. Today a



substantial change is apparent in labor collectives to improve the work and living conditions of aviation workers. The experience of the Lvov Aviation Enterprise is typical in this sense. They are erecting houses here with their own resources, and shareholding has been developed. Their experience has been taken up. And here is the result: last year alone, over 20 percent of the housing was built through the efforts of aviation enterprises.

We have looked for funds in the ministry's "coffers" as well. So 1,500 apartments have been built through the transfer of 10 percent of the capital investments from production construction to housing.

I think we will move ahead even farther in this way to fully meet aviators' social needs. There are quite a few unresolved problems with working conditions, wages, and pension provisions for aviation workers. All this is considered of primary importance in the program for the sector's socioeconomic development.

[Khodyrev] Aeroflot has always been the face of scientific and technical progress, figuratively speaking. Now this face has become noticeably pale. How do we restore its former luster, and what do you plan to do for this?

[Panyukov] Indeed, the wear and tear on the fleet of aircraft we now have is becoming more and more substantial. This is quite alarming. We are eagerly looking forward to receiving new-generation aircraft—the Il-96, Tu-204, Il-114, and others—from the aircraft industry. Preparations to receive them are already under way at Domodedovo, Sheremetyevo, and Borispol. After all, use of the new equipment is related primarily to a qualitative increase in professional level, the equipment of enterprises' ground facilities, and the mastery of new technologies. So our preparations are under way beforehand. Only the times for delivery of the new aircraft continue to be postponed. But how are we to compete with foreign airlines with old types of aircraft?

[Khodyrev] Perhaps by a simpler way, purchasing modern aircraft abroad?

[Panyukov] This is a simple method, but it is too expensive in the present stage. Although I must say that we have already decided to purchase a consignment of A-310 aircraft under "lease" conditions, so that we can train cockpit personnel and engineering and technical personnel with them for operations with advanced aircraft. But all this is in the long term.

[Khodyrev] Since we have already touched upon the question of cooperation with foreign airlines, I would like to know how you assess the activity of joint enterprises formed in civil aviation.

[Panyukov] It is a positive assessment on the whole. After all, Aeroflot is developing in the context of the world economy, and we must actively take root in this process. Today we have 24 joint enterprises that were formed with airlines and firms in the United States, the

FRG, Belgium, Ireland, Canada, Cyprus, and other countries. Their objective is to expand the volume and improve the quality of passenger services, build hotels, transport cargo, and first of all, to build and operate infrastructure facilities such as air terminal complexes, hotels, and hangars for which civil aviation has a critical need.

A number of enterprises are already making a profit. Their foreign participants are putting in their share of capital in freely convertible currency, but the Soviet participants' share is in rubles or the cost of carrying passengers and cargo in conformity with the tasks of the enterprises. Along with the profit, these enterprises are acquiring advanced technology, and when construction of the various facilities has been completed, they can expand the range of international operations, improve the quality of passenger service, and raise it to the level of the world's leading airlines.

I wish to take this opportunity through the newspaper to congratulate all employees in the sector, especially the veterans of Aeroflot, on the Victory holiday.

#### **Deputy Minister Discusses Scientific Progress, Economic Programs**

904H0216A Moscow VOZDUSHNYY TRANSPORT  
in Russian 29 May 90 pp 1-2

[Interview with A. Aksenov, deputy minister of civil aviation, by VOZDUSHNYY TRANSPORT correspondent V. Dubovoy: "We Are Expecting Changes for the Better in Science"]

[Text]

[Dubovoy] Aleksandr Fedotovitch, isn't it time to acknowledge that the monopolistic tendencies in our economic system have affected not only the development of industry, but transport, including Aeroflot, as well? The impression is sometimes created that this phenomenon is not subject to changes in the development of economic processes in our country.

[Aksenov] Monopolism in industry and transport in our country is essentially the outcome of the command-administrative system and an inflexible planned economy. This system is being dismantled today, being replaced by a market economy; consequently, the end is coming for monopolism, whether we want it or not. A market economy and monopolism are incompatible. Our two domestic monopolies—the Ministry of the Aviation Industry and Aeroflot—must be demonopolized more rapidly. How will this be done?

The Ministry of Civil Aviation has publicized its concept of a transition to demonopolized status. This concept was developed by a group of scientists in the sector whose scientific leader is V. Kurilo, a candidate of economic sciences and a deputy minister. The concept was approved by the MGA [Ministry of Civil Aviation] collegium and essentially was not subjected to serious

criticism when it was discussed by the chiefs of administrations. The ultimate objective is Aeroflot's transition to a demonopolized system of independent airlines, associations, and the like.

The Ministry of Civil Aviation is being turned into a state regulatory organ; its principal tasks are scientific programs and forecasts, the development of standards for flight safety, certification of aviation equipment, airports, and enterprises and the maintenance and repair of aviation equipment, the issuance of licenses for flights, personnel training and retraining, inspections, and so forth. At the same time, most of the ministry's tasks will be performed under agreements with airlines.

It is assumed that two or three airlines will be flying over one route, competing with each other. This is according to the concept. Unfortunately, all this looks much more complicated in reality. First of all, there are strict limits on airplanes and helicopters and on kerosene and gasoline, and consequently, on the throughput capacities of air transport.

Public demand is increasing more rapidly today than the capacity of transportation facilities. This is very bad. According to modest estimates, 20 million persons were not flown in 1989, but there may be 40 to 50 million who have not been flown by 1995. In this situation, it is necessary to develop extremely effective measures, primarily to update the fleet of airplanes and helicopters. The sector's scientists have prepared proposals on this problem which were discussed at the first session of the sector council and subjected to the most severe criticism. The council members found no extremely effective measures in the proposed program, and consequently found nothing to guarantee a way out of the crisis situation. The proposals are now being modified and intensive work is under way with the MAP [Ministry of the Aviation Industry] to coordinate the program to develop the fleet.

It must be said that even the "modest" draft of the program proposed by the sector's scientists has not been supported with financing yet, and the MAP's production capacities cannot deliver series aircraft in the quantities we need. And we must say here that the Ministry of the Aviation Industry must be demonopolized, and it must be done immediately. The MAP's specialists should decide how this is to be done.

[Dubovoy] Do you have any formulas?

[Aksenov] In my view, unless the Ministry of the Aviation Industry is relieved of consumer goods, returned to civil aviation (in connection with the conversion), and demonopolized, it will continue to be an obstacle to modernization of the aircraft fleet and we will continue to lag behind the developed countries.

Moreover, our country's aircraft industry, like no other industry, can reach leading positions in the world in a short period of time (5 to 7 years) and develop competitive airplanes and helicopters, providing them not only

for airlines in the USSR, but selling them as well. But we must reconsider state policy with respect to the MAP and the MGA for this and give their development high priority.

Investments in the Ministry of the Aviation Industry and the Ministry of Civil Aviation can be recovered rapidly and efficiently. It is many times more profitable for the country to invest funds in the Ministry of the Aviation Industry to increase the production of modern aircraft, to sell them (a world market exists), and to purchase consumer goods with the foreign currency earned than to burden the MAP with consumer goods production. At the same time, the reequipment of Aeroflot (let us consider Aeroflot as an association of free airlines in the USSR) will make it possible to offer transportation services to the public for a sum that is no less than 2 billion rubles more than today and to relieve the critical social tension.

In completing my answer to this question, I want to stress again that if we do not move quickly to demonopolize both Aeroflot and the Ministry of the Aviation Industry, this will be an obstacle to the process of perestroika. This is the reality.

[Dubovoy] What do you see as the main reasons for the obstacle?

[Aksenov] I can cite two main reasons.

First of all, the system of neutral or very weak economic incentive for enterprises to make use of the achievements of science and technology that was established before. This applies to Aeroflot as well. Excessive centralism led to the point that initiative by a unified detachment or administration was not encouraged. The results of scientific research were introduced from the top—by orders, instructions, and the like. According to the laws of mechanics, once there is introduction, there should be resistance as well. There was resistance, and a great deal of it. Today the situation is changing for the better. Enterprises' shift to economic independence has sharply increased their interest in the introduction of scientific developments. The fact that more than half of the scientific work in the sector is being conducted under direct contracts with enterprises attests to this. The shift of scientific organizations to cost accounting also has contributed to this. Activity has increased, but not always in the direction needed. Science's shift to cost accounting has brought out two major problems (in experience from 1988 and 1989):

- inability to correctly determine a contract price; and
- rapid exhaustion of scientific work in progress which was begun previously.

[Dubovoy] A little more detail on this, if possible.

[Aksenov] There can be a special discussion on the contract price, and the subject is worth it. It may be stated here that two unequal partners—the producer-customer and the scientist-executor—have been sitting

at the contract price negotiating table. Neither one has been proficient in calculating economic, social, and other effectiveness in introducing the intended result. For this reason, these calculations are not taken as the basis for a contract price, as a rule. The calculation of expenses proposed by the executor, which is a "dark box" for the customer, is what is taken. At the same time, the customer has no idea what kind of contract price will be set, but the executor (the scientist) immediately sees his own future earnings in this price. The higher the contract price, the higher the earnings. Under conditions in which a market had not been established for the scientists' proposals and there was essentially a monopoly by a number of NIO's [scientific engineering societies], prices rose and scientists' wages were substantially increased. But this was in the first 1.5 to 2 years. The situation is changing now. The customer is becoming more experienced every day, he is mastering economics, and he does not agree so quickly to the contract price proposed by the scientists. In addition, the scientific institutes have begun to keep a closer watch on the quality of scientific output and its conformity to the contract price.

The GlavNTU [Scientific and Technical Main Administration] of the Ministry of Civil Aviation has offered its services as an arbitrator in resolving the problem of contract prices when the customer and executor do not agree on a contract price. There are two parts of the sector's scientific establishment—one part has been demonopolized (the NIS [scientific research departments] of VUZes, a number of laboratories in the GosNII GA [State Civil Aviation Scientific Research Institute], the NETs AUVD [Scientific Experimental Center for Civil Aviation Air Traffic Control Automation], and the like). Everything is more or less clear with this part's shift to cost accounting. If a contract price proposed by the NIS KIIGA [scientific research sector of the Kiev Institute of Civil Aviation Engineers] is high, for example, similar work can be performed by the NIS MIIGA [Moscow Institute of Civil Aviation Engineers], and this may be less expensive. There is competition. It is quite difficult with the other part—the monopolistic part. For example, a document to extend service life cannot be obtained without the GosNII GA. This procedure was legalized by government decisions. In order to extend service life, we have to go to the GosNII and conclude a contract with it, but it is a monopolist in this case and it can ask any high price, as the customers say.

Incidentally, an impartial discussion was held on this subject by the chiefs of administrations and chief engineers with the chief of the GosNII and me. Many complaints, indignant statements, and demands were made. The leadership of both the GosNII and the GlavNTU should take a serious look at this matter. A solution will be found. Concern about scientific work in progress is quite correct. Cost accounting is ruthless in requiring a practical result and it does not accept basic research, a risk, or work in progress, and so forth. Those engaged in both large-scale scientific work in the country

and our sector's scientific work are seeking a way out of this situation. There are alternatives for discussion. There is the development of sectorial scientific research programs financed from a centralized fund, in which we must provide for basic research, work in progress, and the groundwork; funds can be the funds of institutes for basic and groundwork research; and there may be competition to fulfill state programs (subprograms)...

Secondly, not all scientific developments are turned out on a high scientific level and meet the demands of production. There are two reasons here. One of them is subjective, when unqualified persons join the ranks of scientific associates but proper control is not exercised by the scientific research society managers. True cost accounting, and we are coming to this, will expose these individuals, and they will leave scientific work. The main point is that it is important to have a mechanism to evaluate a scientific result both within a scientific institution and for the customer. When accounts are signed "confidentially," without any evaluation based on principle, it is chiefly the slipshod workers who will live quite well off science. Unfortunately, our customers are quite kind at present. More than 1,500 contracts were made during 1989, and there was not one serious criticism from the customers. There is something to think about here, although as a manager of sectorial science, I should be pleased—if a customer has accepted something, it means the quality is good.

There is an objective reason: we cannot resolve a number of the most important problems for the sector or resolve them on a low level because of the lack of the necessary scientific facilities and high-quality specialists. We need a large amount of computer hardware, special test stands, proving grounds, and testing equipment. We do not have a great deal in the country and we have to purchase it with foreign exchange. We need to change our attitude and that of sectorial science managers toward science here; this refers primarily to the chiefs of institutes and VUZ rectors, as well as managers in the Ministry of Civil Aviation and the collegium and sector council.

Unfortunately, we have a poorly developed scientific base for forecasting and studying the market, for studying the human factor, for research in materials technology, and for widespread application of mathematical modeling.

[Dubovoy] Domestic aircraft manufacturing is involved in developing fundamentally new aircraft. At a time when many leading firms in the world are engaged in modifying them. What is this—far-sighted calculation or wasteful mismanagement?

[Aksenov] The process of developing airplanes and helicopters here and in the West is fundamentally the same. A new airplane or helicopter is also developed on this basis—a family of modifications of this airplane or helicopter. The Il-96-300, Tu-204, Il-114, An-74, and other aircraft that are being developed have their own

families of modifications, very attractive ones, incidentally, and we would be pleased to purchase them. The point is that we and the West are operating under different conditions from the viewpoint of capabilities. Western aircraft manufacturing firms are owners of an aircraft from its concept until it is written off and they have the means for this (experimental production, series production, guaranteed contract conditions). Under these conditions, the managers of a firm can flexibly and rapidly readjust production to a modification by studying the market. By the time that demand for the family of modifications declines, a new aircraft is developed.

We have a different, more complicated and less flexible structure: the OKB [experimental design bureau], headed by a general designer, can make only a prototype, and series production is carried out by a plant which is not dependent on the OKB. Their communication with each other is through the Ministry of the Aviation Industry.

The Ministry of Civil Aviation, in the role of customer, first orders a prototype aircraft, and later, after certification, it purchases a series aircraft from the series plant. In such a structure, we essentially do not have one owner of an aircraft from its development to the time that it is written off, although formally, the general designer is the owner.

It is a logical question: why does the Ministry of Civil Aviation order a prototype aircraft? Those who defend this structure respond: so that the customer is not mistaken when he orders the series aircraft. Test it, and if it is not suitable, you will not purchase the series aircraft. It sounds good, but in fact? The series plant begins putting the new aircraft into production long before it has been tested by the customer, and by the time that we can say: "This aircraft is not suitable for us, and it must be modified," it is already being completely "riveted." Now even a very principled statement from us will not change anything, the plant cannot be stopped, and there is simply no other choice. Monopolism in action. It must be broken up. We have proposed an arrangement to the Ministry of the Aviation Industry for new relationships when an aircraft is ordered, as in the example of the order for the Yak-42M. Essentially it means that the Ministry of Civil Aviation would not order a prototype aircraft, but a series of an agreed number of aircraft which meet the TZ [presumably: technical specifications]. The executor from the Ministry of the Aviation Industry is an association established on the basis of the OKB, the series plant, and the engine plant which assumes responsibility for the delivery, engineering support, modification, and so forth. This is the owner of the aircraft.

Modifications of aircraft are being developed in our country, but they are being introduced slowly.

[Dubovoy] In one of the interviews with VOZ-DUSHNYY TRANSPORT, V. Goryachev, the chief of

the GosNII GA, said that the salaries of scientific employees of the institute had been raised, but he finds it difficult to say to what extent the specialists' output has been increased. Tell us, isn't creative scientific research, which is intensive and difficult, being devalued and isn't the concept of labor itself being corrupted?

[Aksenov] Science was shifted to cost accounting in 1988. And the first attempts to improve the activity of scientific organizations that shifted to the new economic conditions led to an increase in the number of contracts with enterprises for research and planning work. But random checks by sectorial institutes and VUZes showed that the subject matter of economic contracts was fundamentally changed with the shift to a system of contract prices for scientific and technical work. Receiving the maximum income in the shortest period of time—this is the main principle. The depth of scientific research has begun to suffer. Moreover, this "scientific racketeering" as I would call it, was not based on technical-economic substantiation and did not reflect the quality of scientific work in any way. Indeed, wages were sharply increased in many cases. On the other hand, many economic managers, by making use of state money without any control, have been transferring all their problems, sometimes elementary ones, to science. A deal was made from both sides.

I have nothing against money that has been earned for work performed if it produces a significant economic gain. To think otherwise is to subject the very system of economic incentives to question.

Some 70 percent of the sector's scientific employees are working under direct economic contracts. This is a large number, of course. But where research is required, whether it is mathematical, chemical, or sociological, or the development of a set of scientific tools, science should have the opportunity for scientific research.

[Dubovoy] With the stable development of society, the different programs for civil aviation's scientific and technical development serve as a reliable basis for looking into the future. The revolutionary changes in the economy in the current stage have substantially disrupted all long-range forecasts, unless we say they have made them useless. Do we need such forecasting under the conditions of a market economy?

[Aksenov] I believe that it is not only needed, it is simply essential. But under market economy conditions it should be a forecast of high quality. Under a monopoly economy a forecast was basically formal, since the ministry purchases everything that is offered, not what it would like. All the world's aircraft manufacturing corporations study the market much more thoroughly than airlines do. I was convinced of this myself when I visited the Boeing and Airbus Industrie firms. They sometimes understand our problems better than many domestic specialists. And for this reason, they are taking into account all the opportunities related to perestroika in our country, as well as the future market. For this reason,

it is also necessary for us not to miss the moment that the market is formed and to be in time to prepare for these new relationships.

[Dubovoy] What can you say about the mechanized facilities which are disastrously inferior to modern flying equipment, such as washing machines which have been developed for about 30 years, for example?

[Aksenov] This is perhaps one of our biggest problems. A program to reequip Aeroflot with small-scale mechanized facilities is now being prepared. And "Aviatransprotss" will become the main executor of this program. Unfortunately, this newly formed scientific production association is still weak. Before demanding full efficiency from it, subsidies are needed to develop the material and technical base and resolve social and other problems. This task awaits a solution and we are monitoring it continuously. Only the first steps have been planned: joint ventures with foreign partners, and new nontraditional forms of interaction with the civil aviation administrations (the establishment of consortiums with "Aviatransprotss"). By the year 2000, we should raise the level of mechanization sharply in all areas up to 80 percent.

### **New Aviation Institute Created**

904H0173A Moscow GRAZHDANSKAYA AVIATSIYA  
in Russian No 3, Mar 90 pp 16-19

[Roundtable discussion among faculty members of Leningrad Civil Aviation Academy, the Institute for Skill Improvement and Retraining of Key Civil Aviation Employees and Specialists, and the GRAZHDANSKAYA AVIATSIYA editorial staff, consisting of V. I. Manayenkov, the institute's director; Assistant Professor N. N. Sokolov, deputy director of the institute for academic work; Professor A. I. Vereshchaka, deputy chief of the academy; Professor F. A. Kryzhanovskiy, chief of the academy; Assistant Professor V. D. Mikhaylov, dean of the Department for Skill Improvement of Key Employees and Specialists; Assistant Professor M. A. Finnikov, dean of the Department for Retraining Key Employees and Specialists; Assistant Professor M. Yu. Smurov, acting dean of the Department for Skill Improvement and Retraining Personnel for Foreign Economic Activity; Professor V. M. Keyn, head of the Computer Technology and Production Management Department; and Assistant Professor V. A. Surin, deputy director for scientific and methods work: "The Institute Has Become the Leading One"; editorial staff questioners were unidentified, but the discussion was prepared for publication by A. Mikhaylov and N. Yachmennikova]

[Text] The Institute for Skill Improvement and Retraining Key Employees and Specialists in our sector was established recently on the basis of the Leningrad Order of Lenin Civil Aviation Academy. The institute is just taking its first steps now, but it has already been mentioned in Aeroflot as a fundamentally new unit in the structure for

continuous training of civil aviation managers and specialists. The journal's "round table" concerns the place and role of the institute in the sectorial system for training and retraining personnel and the tasks and problems it is facing.

[Editorial Staff] Our first question is for the institute's director, Vasilii Ivanovich Manayenkov: why was this educational institution established and why has it been given the status of the leading one in the sector?

[Manayenkov] Civil aviation's current level of development requires that the knowledge of key employees and specialists be constantly brought up to date. And it must be continuously updated, not occasionally, from case to case. Otherwise this knowledge will lag hopelessly behind the latest achievements of science and technology and advanced technology and it will simply be out of date, which will inevitably be reflected in the effectiveness of Aeroflot's work.

The previous system of personnel skill improvement and retraining had one substantial drawback: it was uncoordinated. Managers and aviation specialists in various fields were being retrained by our institutes, the Ulyanovsk center, the Aktyubinsk and Kirovograd Higher Flight Schools, secondary educational institutions, and the training centers of civil aviation administrations. A unified organizational and methods basis was lacking. This led to lack of coordination in the programs and methods of instruction, substantially reducing its quality.

It must be said that we were not the only ones with problems. In other sectors of the national economy as well, the system for skill improvement and training was not meeting the increased requirements either in its scope or the quality of instruction. Taking this into account, the CPSU Central Committee and the USSR Council of Ministers adopted the decree "On restructuring the system for skill improvement and retraining of key employees and specialists in the national economy," in which an expanded program to remedy the situation was formulated, in February 1988. It is aimed primarily at creating a unified state system for training and retraining personnel, providing for continuity of instruction in a mobile and flexible network of appropriate educational institutions, substantially updating the content and forms of training, restructuring the style and methods of its management, and providing effective moral and financial incentive to increase vocational skill. At the same time, it was considered necessary to organize a Leading Institute for Skill Improvement and Retraining of Key Employees and Specialists in each sector.

So on one hand, establishment of the leading institute in our sector was dictated by experience itself; on the other hand, it was a direct response to the party and government decree.

[Editorial Staff] Can you tell us about the tasks entrusted to the institute in more detail?

[Manayenkov] They were clearly stated in the Charter approved last September by an order of the minister of civil aviation. First of all, there is educational work to improve the skill and retrain personnel in the sector, including production and economic instruction for employees at aviation enterprises and in labor collectives. At the same time, the institute is called upon to take part in organizational-methods and scientific research work in its field. Considerable importance is attached to the integration of education, science, and production as well. With this objective, it is obliged to assist in the establishment of educational-scientific-production complexes in every possible way and to ensure that they function effectively. Well, it also goes without saying that we should conduct educational work systematically with students and constantly improve and develop the institute's training facilities and social base.

[Editorial staff] Fine, Vasily Ivanovich. But our readers certainly will ask what will happen to those educational institutions which also were involved in skill improvement and retraining personnel. What are their functions now?

[Manayenkov] I already mentioned that this work was being conducted in an uncoordinated manner, without a unified scientific-methods approach. For that reason, the leading institute has the responsibility first of all of coordinating the activity of Aeroflot's educational institutions, of providing constant supervision of their training methods work, and of generalizing and putting into practice the advanced experience that has already been accumulated. Taking into account the fact that this is not one of the easiest tasks, it was decided to create a special sectorwide Coordinating Council. It is made up of representatives of the CEMA Center and faculties and classes for skill improvement, as well as educational and training centers and our principal customer enterprises. In a word, a unified organ has been established which we feel certain will do away with the dissociation and dispersion of forces and facilities for retraining aviators. But as far as educational institutions' direct participation in this work is concerned, it is not being discontinued by any means; it is now conducted on a fundamentally different basis—in accordance with a coordinated plan, without duplication or any kind of spontaneous activity.

[Editorial staff] One more question. The leading institute, as we already know, was established on the basis of the academy. In a case such as this, how do we interpret its status with respect to its "ancestor?" What do their functions, interests, and objectives have in common and how do they differ?

[Sokolov] In accordance with the status that was approved, the institute's activity is guided by legislation in force, decrees of the CPSU Central Committee and the USSR Council of Ministers, normative documents of the State Committee for Public Education and the Ministry of Civil Aviation, as well as the provisions of its

charter. It operates in accordance with cost accounting, enjoys the rights of a juridical person, and it has an independent balance and a bank account. The CEMA Center, faculties and classes for skill improvement in higher and secondary specialized educational institutions, and educational and training centers are subordinate to it functionally. The director guides all the institute's activity. He has been given the right to represent his collective in all institutions and organizations, to make use of the institute's funds and property, to conclude contracts, to give the power of attorney, to open accounts in a bank, and so forth. Within the limits of his powers he issues orders, and he hires and dismisses employees in conformity with labor laws. All the basic questions of institute activity are reviewed by a scientific council consisting of the director (as chairman), the deputy directors, the director of the branch, the director of courses, the deans of faculties, the heads of departments, the leading professors and instructors, and the representatives of public organizations. What else can be added? The institute has a staff of highly skilled instructors and specialists who conduct educational and training work as well as scientific research work. I want to stress especially that the basic backbone of the staff of professors and instructors was given to us by the academy. You are aware yourselves that it would be impossible to resolve the problem without it. Moreover, the institute makes use of the academy's educational and laboratory facilities, its simulators, and its special equipment every day. So we are not living and operating by ourselves, but in close contact with our "ancestor," as you said. It cannot be any other way, however.

[Vereshchaka] It would be absolutely incorrect if the institute and the academy were operating separately. Then we would become like a character in Krylov's well-known fable—the swan, the crayfish, and the pike. It is common knowledge that there is not much benefit from such "interaction." For this reason, we view the institute and the academy as an inseparable whole. Figuratively speaking, we are not only living under the same roof, we are also standing on the same foundation..

Judge for yourselves. The institute was established on the basis of the skill improvement department, and it has been one of the academy's subunits for about 20 years. It is linked with the academy's organism by hundreds of capillaries of all kinds. Breaking these ties is equivalent to removing vitally important organs, which we cannot and should not permit.

Further. For the institute's educational process to meet the highest requirements, it needs skilled professors and instructors. And the academy has given such personnel to the institute. It is sufficient to name Professors Keyn and Zakharov, Assistant Professors Mikhaylov, Finnikov, Smurov, and others. And the institute's board of directors is made up of Assistant Professors Manayenkov, Sokolov and Surin, who are also academy staffers. They have headed up the main directions in the institute's work and have become its brain and heart, I would say. In addition, many scientists from the academy are

lecturing at the institute under conditions in which they hold two staff positions and are paid by the hour. They include such important specialists as Professor Olyanyuk, Honored Scientist and Technician of the RSFSR Fedorov, Professors Kudryavtsev, Solovyev, Babantsev, and others. There is no question that this cannot help but have an effect on the quality of the students' instruction, and in the final analysis, on the institute's authority and prestige in the sector.

[Kryzhanovskiy] I will add to what has been stated. Realizing that our existing scientific base cannot be divided between the institute and the academy is a sound approach to the matter. It should be unified. Otherwise we will break it up into pieces, which will weaken our entire scientific establishment. This cannot be permitted by any means. Let the institute and the academy have their own independent balances, but the scientific personnel, the facilities and research program should be closely coordinated. Only this way, not in any other way. And anyone who does not understand this is harming our common endeavor, voluntarily or not, and is bestowing a doubtful benefit on the institute as well as the academy. Moreover, it is also harmful to the sector as a result.

[Manayenkov] I fully agree. Our science should be developed as a unified whole. The only thing we should not forget about is the cost accounting. Both the academy and the institute are fully independent organizations in this respect, and we must find the best possible alternatives for interaction. More simply put, neither one of two partners in science should be a loser. Otherwise, this fundamentally contradicts the entire spirit of the economic reform being carried out in the course of perestroika.

[Editorial staff] There is no doubt that realism and mutual interest in the success of a common endeavor are prevailing in these matters, not ambitions. But now we would like to have more details on the kind of structure the institute has and what you intend to teach the students.

[Sokolov] Let us begin by stating that three departments have been created in the institute: for improving the skill of key employees and specialists, for retraining key employees and specialists, and for skill improvement and retraining of personnel for foreign economic activity. Each department has a number of specialized chairs. As an example, the Skill improvement Department has chairs for work organization and new management methods, aviation pedagogy and active training methods, and automated control systems in flying activity. The Retraining Department has chairs for systems methods of analysis and control, sociopsychological management methods, and computer technology and production management. And our third department has two chairs: foreign economic activity and foreign languages.

In brief, this is the structure of the institute. It corresponds fully to the objectives and tasks set for it.

[Editorial staff] And now we would like to ask the deans of the departments to provide more details on the range of problems being resolved by their scientific collectives.

[Mikhaylov] Our department's principal task is to provide managers and specialists in the sector with the latest knowledge in various fields of management and production activity. The content of the curricula and programs depends on the vocations of the students, their level of theoretical training and practical experience. We give an important place to courses such as new management methods, the organization of production management, social processes, and the commercial activity of aviation enterprises. The length of training also differs. It may last from two weeks to two months.

This is a typical feature: we do not simply gather students together and provide them with knowledge of a certain type. Each one of them comes to us not just to "learn a little more." He determines that he has a specific problem in his work that must be resolved, and he studies it here under the guidance of experienced instructors and scientists. After he returns to his enterprise, he puts this study into practice.

[Finnikov] We are retraining Aeroflot managers and specialists in three directions.

The first one is a specialist's professional reorientation. Let us say that a pilot or navigator who has finished flying intends to continue his work as a detachment chief of staff, and assistant squadron commander, and airport shift chief, or the like. After coming to us for retraining, he will acquire a minimum knowledge which he needs in the new position.

The second direction involves retraining personnel to work with advanced equipment and modern technology. This may be for specialists studying the use of computers in production processes, the means for objective control of flying activity, and the like. The training of managers is a special "section." The graduates of this department, in our opinion, should play a decisive role in perfecting the organizational and technological processes in air transport work, as well as in the processes of managing aviation enterprises and the structural subunits.

The third direction involves retraining of personnel from the reserve for advancement. This applies to the training of squadron commanders, ground service managers, and so forth, let us say. In addition, training is planned for specialists from other ministries and departments who are taking part in Aeroflot production processes. These are pilot-observers, navigator-aerial photographers, and others.

The retraining period in our department lasts from four to ten months. The instruction process is organized by taking the clients' wishes into account. We also conduct



practical lessons at the aviation enterprises themselves, that is, under actual production conditions.

The department's curriculum consists of disciplines combined into three units. These are sociopolitical and legal disciplines, disciplines in the economic and management cycle, and disciplines related to the retraining of specialists.

Practical games, lessons out of town at aviation enterprises, and other active forms of instruction are all included in our training arsenal. Each graduate is obligated to defend his work on a specific problem. After this he is given a diploma corresponding to his specialization.

[Smurov] Our department was established because of civil aviation's continuously expanding foreign relations. More and more frequently we encounter a shortage of specialists capable of organizing the work in airports' international sections, let us say, of flying abroad, of controlling air traffic on international airways, of managing flight attendant services on international routes, and so forth. There is a particular shortage of managers and organizers of joint ventures, the number of which presumably will increase. There is also a need for different types of training for aviators in socialist countries and those with ICAO [International Civil Aviation Organization] grants. Our department was designed for these categories of specialists. The lectures and practical lessons are given not only by instructors from the institute and the academy, but so-called "holders of more than one position" who have a great deal of experience in practical work at Aeroflot offices abroad and in international civil aviation organizations. In addition, we are establishing a specialized "Business Center." The department's students will become familiar there with the latest telecommunications systems and office facilities and the technological aspects of modern business.

[Editorial staff] About the students, by the way. What is the procedure for admitting them? As far as we know, it was not too long ago that candidates were often sent to skill improvement departments and even to Higher Command Classes in accordance with the principle "It's for you, you poor thing, we have no use for it." In other words, aviation enterprise managers often have sent an employee away for training not to train a needed specialist, but to get rid of a stupid or objectionable employee. What can you say in this regard?

[Smurov] I think that it is better for the institute's director to answer this question.

[Editorial staff] Please, Vasilii Ivanovich.

[Manayenkov] What you are referring to has not been altogether eliminated thus far, unfortunately. Last October we had a sectorwide scientific-practical conference on personnel matters under the conditions of perestroika. These negative occurrences were discussed there as well. When the institute reaches its "planned capacity," nearly 8,500 aviation workers will be studying in it each year. It is not hard to imagine the harm we

would do to the sector if we make up each group in accordance with this notorious principle. For this reason, in making use of this occasion, I would like to appeal earnestly to the managers of Aeroflot administrations and enterprises to select candidates for retraining responsibly and with due consideration.

This is all the more necessary with the institute's shift to cost accounting, because students are admitted for skill improvement and retraining in accordance with direct contracts and for an appropriate fee. The cost of a student's instruction for just 1 month is 249 rubles and 12 kopecks. It is a sizable sum, as we see, and throwing it to the wind would be not only expensive, but insulting.

[Editorial staff] In our view, we cannot pass over this aspect of the institute's work: the most important criteria and principles in organizing the instruction process. In other words, what are the main conditions for effectiveness in training the students?

[Sokolov] This question is the closest for me as the deputy director for academic work. First of all, we must teach only what is new: new equipment, new technology, new production control systems, and so forth. Only in this way can we ensure that the development of education takes the lead over production.

We see another condition for success in the closest possible integration of science and practice and fundamentally new forms of their interaction. This involves taking part of the instruction process directly to production, which is essentially a natural proving ground for training personnel. So the first training-scientific-production complex, which made it possible to combine the efforts of scientists and experienced workers, was established on the basis of the academy, the institute, and the Leningrad Administration. It must be said that everyone has benefited from this: the ones who are taught and the ones who teach, as well as the ones who are engaged in resolving production problems. Our institute also has established close contacts with the International Air Services Central Administration, the Tajik, Yakutsk, and Magadan Administrations, and other production collectives. We will continue to develop such relations further.

[Keyn] In speaking of this problem, we must not forget about the most important means of improving the quality of the instruction process—computerization. To our great regret, far from all employees of educational institutions have been able to become familiar with computers. Meanwhile, we simply cannot manage without the use of computer hardware today.

It goes without saying that our institute is not operating in isolation with respect to questions of computerization. We are making active use of the academy's base, the Leningrad Administration's computer center, and other civil aviation organizations.

[Manayenkov] There is one more principle that we adhere to—a decisive change from mass training in large



numbers to individual instruction. Only by dealing with each specific student, by developing his individual abilities, and by making use of active forms and methods of instruction can success be achieved.

[Editorial staff] We think that our conception of the institute would be incomplete if we did not mention an aspect of its activity such as scientific research. Isn't that right?

[Surin] Absolutely correct. The institute's scientists are conducting active scientific research in many fields.

First of all, we have been entrusted with developing a concept for continuous education in civil aviation and planning and introducing the best possible sectorial system for managing the skill improvement and retraining of managers and specialists. The work is fundamentally new and labor-intensive. It is being carried out at the order of the ministry's Educational Institutions Administration and Personnel and Social Development Administration.

Secondly, our specialists are conducting research in the field of production management. The principal efforts are now being concentrated on developing and introducing new management methods. Sectorial and territorial administrations are the clients.

Thirdly, at the order of the International Air Services Central Administration, we are developing the concept for Aeroflot's foreign economic activity. Importance is devoted in this research to characteristics related to the establishment of joint ventures. There are many difficulties in this work and aspects that are unclear, but the task of science is to find answers to all the questions that arise as rapidly as possible.

We are all accustomed to civil aviation being actively utilized in various sectors of the national economy. One would think that everything has been studied and researched here. But times have abruptly changed, and a great deal that was acceptable yesterday has turned out to be completely useless today. In this connection, it has become necessary to work out scientifically grounded requirements to improve the technology of aviation work in sectors of the national economy. And this has also become an integral part of our research.

Other studies being conducted by the institute may be mentioned as well. The most important ones are related to the direct interests of aviation enterprises in the field of cost accounting relationships, the organization of flying work and air traffic control, flight safety and transport efficiency, and ecological and other problems.

In a word, the institute is making a substantial contribution to the sector's work. But we do not plan to stop with what has been achieved. By combining our efforts with the academy's scientific potential and with the support of production collectives, our scientists will move forward without fail.

#### From the editorial staff

So we have discussed a rather broad range of questions related to the various aspects of the life and activity of our sector's new educational institution. The limited scope of our published material did not enable us to present all participants in the discussion. They included Assistant Professor R. N. Drachkov, head of the Foreign Economic Activity Department; Assistant Professor B. I. Buzinnik, deputy head of the Scientific Labor Organization and New Management Methods Department; Assistant professor N. Ye. Demko of the Foreign Economic Activity Department; V. V. Ponomarev, chief of the Training Methods Department; and other institute associates. But everyone taking part in the "round table" spoke with great interest about how to make the new institute the leading one not only in status but in substance; about overcoming the considerable number of problems which unfortunately still exist; and how to resolve the large and small problems that lie ahead. And we believe that this young and friendly collective of enthusiasts has a great future.

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#### Il-114 Aircraft Highlighted

904H0173B Moscow GRAZHDANSKAYA AVIATSIYA  
in Russian No 3, Mar 90 pp 21-28

[Article by D. Leshchiner, Hero of Socialist Labor, winner of the Lenin Prize, manager of the Plans Bureau, and scientific associate of the OKB [Experimental Design Bureau] imeni S. V. Ilyushin; and Yu. Yegorov, lead designer and scientific associate of the OKB imeni S. V. Ilyushin: "The Il-114's Path Into the Sky"]

[Text] In the early 1980's the Experimental Design Bureau imeni S. V. Ilyushin advanced a proposal to develop a new passenger aircraft for local air routes, the Il-114. The proposal was based on an analysis of the requirements for the increasing volume of passenger flights, on the one hand, and an assessment of the prospects for developing different types of aircraft, on the other hand. The more than 30 years of experience in operating different versions of the Il-12, Il-14, and Il-18 aircraft was also generalized and taken into account.

The Ministry of Civil Aviation supported the initiative. In spite of the OKB's sizable workload in developing the long-range Il-96-300, the decision was made to begin planning the Il-114 at the same time, before completion of this work.

The An-24 aircraft, which has been operated since the early 1960's for passenger flights on local air routes in the USSR and has been extensively used in a number of foreign countries, has proved itself well. However, it has ceased to meet requirements at present for both passenger capacity and comfort, as well as fuel consumption. The number of these aircraft has begun to decline gradually as they are written off with the end of their service life. The Il-114's basic specialization should be to carry passengers and cargo on local air routes with heavy

passenger flows, as well as on individual mainlines with light passenger flows, and it is designed to replace the An-24.

### The Basic Development Concepts

In conformity with the Ministry of Civil Aviation's engineering assignment, the Il-114 aircraft should carry no less than 60 passengers (a payload of 5.4 tons, which corresponds to the mass of one passenger with baggage, equivalent to 90 kilograms) and have a service range of 1,000 kilometers and a cruising speed of 500 kilometers per hour at altitudes of 6,000 to 8,000 meters. For operations in Arctic and Antarctic regions, the aircraft should have a 1.5-ton payload for a service range of 4,800 kilometers.

The Il-114's level of technical efficiency is determined by the fuel consumption per passenger-kilometer when it is carrying a full load of passengers for a service range of 1,000 kilometers. This magnitude should be half that of the An-24.

It should be stressed that the requirements of the engineering assignment had a number of features which distinguished them from the requirements made of similar foreign aircraft. First of all, the Il-114 is to be operated from relatively small airports with paved as well as unpaved runways (where the ground is strong enough to withstand 7.5 kilograms per square centimeter). This makes it possible to extend the area of its operation in different parts of the country, especially undeveloped regions, where aircraft are the only form of mainline transportation. Moreover, the aircraft should provide for self-contained operation at airports with little equipment. The task was to develop an aircraft with maximum design simplicity, equipped with a built-in ramp which makes it possible to apply the "carry-on baggage" principle and an auxiliary power plant to obtain air and electricity when the aircraft is on the ground. In addition, fast and easy access to all structural elements, with minimal use of airport ladders, was required in conformity with the technical maintenance program. The aircraft will be operated at night and take off and land under ICAO [International Civil Aviation Organization] Category II weather minimums. Fulfillment of this and other requirements of the engineering assignment called for the installation of complex equipment for various functions, adding considerable weight—more than on similar aircraft of previous generations.

The demands made of the Il-114 were so complicated for an aircraft to operate on local air routes that they not only determined the configuration and power of the power plant, the geometric and weight characteristics, and the structural features, (that is, the sum total of everything which makes it possible to achieve the assigned flight and takeoff and landing characteristics), but the considerable amount of design and experimental work to provide for minimal weight losses as well. In the final analysis, this involved the development of an

aircraft with a level of technical efficiency no worse than that of foreign aircraft which were developed in accordance with simpler engineering requirements—which did not provide for operations from unpaved runways, for example.

As with other "II" passenger aircraft, the Il-114 has been developed in accordance with the design concept which provides for every step to be taken to ensure maximum flight safety, convenience and comfort for passengers, pleasant conditions to make the crew's work easier, high economy, a low internal and external noise level, a long service life and reliability in operation. A simple, easily accessible structure was developed, using advanced technology and the most advanced materials, and provision was made to apply modern principles of maintenance. The aircraft is a low-wing cantilever monoplane with a tail assembly of normal design. The two turboprop engines with takeoff power of 2,500 equivalent horsepower positioned on the wing are equipped with low-noise six-bladed propellers 3.6 meters in diameter and an automatic system for feathering the blades in flight. The configuration of the engine nacelles, as well as their position with respect to the wing and the high-lift devices, are determined by the aerodynamic, strength, structural, and operational requirements aimed at providing for the characteristics assigned. The positioning of the nacelles on the wing was selected by taking into account the need to maintain the rolling and turning moments within the minimum possible range in the event that one of the engines fails, as well as to provide for less noise in the passenger cabin and cockpit.

The aircraft's wing was designed on the basis of extensive research and experimental work conducted jointly with the TsAGI [Central Aerohydrodynamics Institute imeni N. Ye. Zhukovskiy]. It has a high level of aerodynamic efficiency and is equipped with efficient high-lift devices consisting of double-slotted extension flaps with a fixed deflector which are deflected at angles from 10 to 40 degrees. Lateral controls are installed on the wing as well: ailerons equipped with servo balance and trim tabs and spoilers (one section on each wing) which are deflected up to a 40-degree angle and are used to compensate for roll when one engine fails. In addition, there are four sections of air brakes (two on each wing) which are deflected upward at a 50-degree angle at the moment of touchdown, which makes it possible to use the landing gear brakes effectively at the very beginning of the landing rollout. The wing has a high aspect ratio, equal to 11, and its area of 81.9 square meters was determined both to provide for the performance stipulated and the assigned conditions for basing the aircraft at airports with short runways.

The parameters selected for the tail section make it possible to obtain standardized features of stability and controllability in a takeoff with one engine. The tailplane holds the elevators and trim tabs and the vertical tail surface holds the rudder and trim tab with a servo balance. Determination of the area of all control surfaces, servo balance tabs and trim tabs, the extent of

their aerodynamic compensation and selection of the necessary hinge moments was given a great amount of attention—all these parameters were selected jointly with the TsAGI on the basis of an analysis of results from tests with models of the aircraft and fuselage sections with a full-scale tail section in wind tunnels.

The Il-114 has a circular fuselage. In working out the arrangement of the passenger cabins and the cargo holds of the Il-114, two basic problems were resolved, along with a number of others. First of all, providing comfort for passengers equal to the comfort in mainline passenger aircraft. And then, providing for the aircraft's self-contained operation at unequipped airfields by application of the "carry-on baggage" principle, with the opportunity at the same time to make use of fixed and ground-based facilities at equipped airports for passengers to board and deplane and baggage and cargo to be loaded and unloaded.

In connection with this approach, a fuselage 2.86 meters in diameter was selected, which makes it possible to position four passenger seats in one lateral row with an aisle lengthwise 450 millimeters wide between the rows. In the basic configuration of the passenger cabin, 60 to 64 seats can be accommodated with spacing of 780 to 750 millimeters. The seats are two-unit in design, with armrests that fold upward. A small collapsible table is in the back of the seat ahead. Over each row of seats, on the lower surface of the baggage racks, there are buttons for calling the flight attendant and receptacles for individual air cooling and reading lamps.

The passenger cabin contains a galley unit, wardrobe and toilet in the aft section. Emergency and rescue equipment is provided in the cabin as well. The passengers will be served by a flight attendant, who has a jump seat and the necessary equipment in the aft section of the cabin, at the entry door.

The main entry door and the built-in ramp for passengers to board and deplane are located aft of the cockpit on the port side of the aircraft.

The passengers' baggage and accompanying cargo are stowed in the forward luggage compartment on the starboard side and in the aft cargo hold. The baggage compartment is for the usual baggage, and the cargo hold is for cargo, as well as bulky or heavy baggage. Baggage may be loaded in two ways, by the passengers themselves or by service personnel. In the first method ("carry-on baggage"), the passenger puts his baggage in the forward compartment himself. For the passenger's hand-carried items, there are baggage racks installed in individual sections 2 meters long over the seats in the cabin. Up to 30 kilograms of hand-carried luggage can be accommodated in each section. In the second method, the baggage is loaded by the airport's mechanized facilities through hatches (fore and aft) on the aircraft's starboard side. Use of the "carry-on baggage" option, combined with the built-in ramp, will make it possible to increase the

aircraft's self-contained operation and reduce the time it is parked at an intermediate airport.

Configuration of the Il-114's passenger cabin is flexible, depending on the needs on a specific route. By taking away the easily removable partition between the passenger cabin and the baggage and cargo hold on the starboard side, the passenger capacity or, on the other hand, the baggage and cargo volume, may be increased.

The digital flight control and navigation complex of the Il-114 provides for automated and manual control on the airways of local air routes with or without facilities, at any time of day and in any season, as well as for landing approaches under ICAO Category I and II weather minimums. The flight control and navigation complex includes an automatic flight control system, a system for measuring and displaying air data with equipment warning of dangerous conditions, as well as a system for measuring and displaying the aircraft's spatial attitude. This will make it possible for the aircraft to be flown by a two-man crew: the aircraft commander and the copilot. In this case, the aircraft commander will pilot the aircraft in the critical stages of flight, control the engines and the aircraft systems, and assist the copilot in performing navigation tasks. The copilot will pilot the aircraft en route, be responsible for navigation and radio communications, and control the engines and aircraft systems at the commander's instruction. It is assumed that both crew members will have professional training which enables them to replace each other in performing their functional duties.

The arrangement of the cockpit interior and the positioning of equipment take ergonomic requirements into account, which ensures that the controls can be reached conveniently from the pilots' positions. The pilots have a good view of the displays and levers intended for common use by both pilots, as well as the displays and levers intended for only one crew member. This makes it possible for either one to monitor flight information and the position of control levers. As a result, there is redundancy in the work, the pilots have uniform workloads, and flight safety is increased.

For a crew of two to perform their duties successfully, just as on the Il-96-300, all facilities for displaying data, warning signals, and the controls for on-board systems are combined in a single data-control system. The data needed to fly the aircraft and for navigation (including critical flight regimes), as well as data on operation of the aircraft systems, are displayed on color screens mounted on the pilots' instrument panel. On a separate (central) display, the parameters of the systems' operation are shown, their condition is monitored, and malfunctions that arise are identified. In addition, as on the Il-96-300, the so-called "dark cockpit" principle is put into practice. After all preflight operations are performed by the crew, throughout a routine flight in which all on-board systems being monitored are in good working order, there are no signals at all on the instrument panels, except when systems that operate intermittently are

turned on. Signals appear on the cockpit panels only in the event of failures capable of affecting flight safety. The crew acts in accordance with them, correcting or localizing the problem or shutting down the malfunctioning system.

### Structural and Engineering Features

The high demands made of the Il-114's level of technical performance, which is reflected in the indicator of fuel efficiency just as with the Il-96-300, are met by utilizing the latest scientific and technical achievements in the struggle for aerodynamic and weight efficiency, as well as the technical efficiency of its engines. A great deal of work has been carried out in all these areas. The aircraft's aerodynamic efficiency is ensured by a large number of different measures worked out jointly with the TsAGI. They include the use of a wing with a high aspect ratio and refined profiles, improvement of the aircraft's localized aerodynamics—joining the wing to the fuselage with fairings, connecting the wing to the engine nacelles, and "refining" the shapes of the nacelles, the flap rail fairings, and various raised structures. Steps were taken to reduce the number of slots between fixed parts and movable surfaces, and where possible, the slots were sealed. Increased fuel efficiency is also made possible by optimizing the flight modes and carefully matching the features of the functional systems and the engines.

A great deal of attention was given to the aircraft's mass by developing an improved design for the airframe and the systems and utilizing new materials and lightweight equipment and complete units. A large number of tests were conducted to ensure the necessary strength, to provide for the service life assigned and the survivability of the aircraft's airframe. Various assemblies and systems were carefully checked out on test stands.

The structure of the airframe was based on the requirement for a service life of 30,000 flights. Its elements were selected on the basis of the optimum level of allowable stress, which is a compromise between the requirement for high weight efficiency on one hand and the strength, reliability, and service life established on the other hand. As a whole, compared with previous Ilyushin aircraft and domestic aircraft of a similar class, a number of solutions were incorporated in the design of the Il-114 airframe which increase its technical efficiency.

The fuselage has the usual all-metal structure of the semimonocoque type, consisting of skin reinforced with a longitudinal-transversal framework of stringers and ribs. A basic feature of the fuselage structure is the use of stringers and rib rings rolled from a sheet of aluminum alloy, which makes it possible to increase the technological efficiency of the structure and its corrosion resistance (by keeping a plated layer on the rolled elements) and reduce the mass—compared with a structure using extruded shapes.

The design of the load-carrying wing torsion box is similar on the whole to the design of the Il-96-300 wing:

a two-spar structural box made up of integral-modular panels. The panels consist of skin machined for thickness (it becomes thinner from the root to the tip of the wing) and stringers riveted to it with soft-collar rivets. This type of joint makes it possible to increase the durability of the panel, to seal the seams without additional sealants, and to automate the riveting process using highly efficient automatic devices with programmed control. In connection with the increased structural service life requirements, the allowable stresses for the Il-114 wing panels are lower than those for the Il-96-300.

The load-carrying wing torsion boxes form starboard and port integral tanks; access to them for installation, as well as inspection of structural elements in the process of operation and maintenance, is provided through hatches on the lower surface of the wing. The leading edge assembly of the outer wing from the nacelle to the wingtip is removable for access to different service lines and assemblies, and the section from the side of the fuselage to the engine nacelle will have a hinged panel underneath. The skin panels on the wing's trailing edge also may be opened.

Special attention was devoted to anticorrosive protection for the all-climate airframe. For protection of the interior surfaces of the airframe, different paint-and-varnish systems with hot air drying were used, and a self-contained sanitary unit and sump under the battery compartment in the fuselage prevents harmful liquids from falling into the space under the fuselage floor. Condensate is removed from places where it may accumulate by a venting system. The zones more susceptible to corrosion are protected by preventive inhibiting compounds. The airframe's exterior surface is protected by plated skin, anodization, and a paint-and-varnish coating based on polyurethane enamel which gives the aircraft an attractive, up-to-date exterior appearance.

Parts made of composition materials were used in manufacturing elements of the airframe and the passenger cabin interior. Lightweight structures made of fiber glass, as well as three-layer panels with polymer honeycombs and fiber glass coverings made without adhesives, were used in the interior. Elements of the airframe structure which bear comparatively less load and do not determine safety of operation will be made of composition materials at first: elements of the high-lift devices, fillets between the wing and the fuselage, fairings, and service hatches.

The flaps and air brakes are controlled by a hydraulic drive remotely controlled electrically. The elevators, rudder and ailerons are controlled manually, with the aid of rigid rods.

The aircraft has tricycle landing gear. The nose gear is retracted forward against the approach flow into a special compartment in the fuselage nose section. The main gear is attached to a load-bearing wing torsion box and is also retracted forward into compartments in the engine nacelles. The size of the wheels and the tire pressure (6 to

6.5 kilograms per square centimeter) were selected on the basis of the condition that the aircraft is to be based at airfields with both paved and unpaved runways. The landing gear wheels will be equipped with monocarbon brake disks.

Because of the main gear's wide wheels, the aircraft resists overturning in a drift landing and when braking and turning on the ground. Positioning of the main gear aft of the aircraft's center of mass ensures that the nose gear has sufficient loading necessary for stable taxiing and the required margin to prevent the aircraft from tipping over on its tail with an aft center-of-gravity position; it also makes it possible to lift the nose of the aircraft with acceptable forces on the controls during takeoffs with forward center-of-gravity positions.

In taxiing, the nose gear wheels are turned with the aid of hydraulic cylinders within the range of plus or minus 55 degrees of the vertical axis, which enables the aircraft to make a 180-degree turn on a paved runway 27 meters wide.

All landing gear is retracted and extended with the aircraft's hydraulic system. The landing gear hatches are closed with doors in the extended and retracted positions. The landing gear is extended in an emergency by the weight of the gear itself and the approaching air flow after the locks in the retracted position are released—with the aid of mechanical linkage from the cockpit.

The Il-114's fuel system was designed in order to achieve maximum reliability, minimum mass, the most structural simplicity, and accordingly, simplicity of operation and maintenance. The system is designed to operate with all types of fuel used in engines. The Il-114's fuel is stored outside the fuselage in two torsion box tanks located in the outer wing panels. The tanks hold 8,360 liters altogether. Each torsion box tank has service and preservice compartments. Fuel is fed from the service compartment to its engine by two electric centrifugal pumps, and these pumps can be installed and removed without entering the fuel tank. Maximum fuel output from the tanks is provided by jet transfer pumps. The fuel tanks are drained through pipelines installed in the stringer framework of the wing and connected to drain tanks in the wingtips.

Both fuel tanks are filled through a filling point on the lower surface of the right wing. Fuel is filled under a pressure of 4.5 kilograms per square centimeter through a fuel valve in each tank with an output of 600 to 700 liters per minute. Fueling is completed in 12 to 14 minutes, but fueling for a flight assigned for 60 passengers will require no more than 5 minutes.

For its power supply, the aircraft has a 200/115-volt alternating current system at a frequency of 400 hertz and 27-volt direct-current system. Two generators of 40 kilowatt-amperes each installed on the engines serve as the source of electricity. The engines are started by an air starter with the aid of an electronic controller. An engine

may be started with the on-board auxiliary power plant, the engine in operation, or by a ground source.

The air conditioning and pressure control system provide air to the pressurized cabin at cruising altitude. In this case, the "altitude" in the cabin will be equivalent to a flight altitude of 2,400 meters, but the pressure differential between the cabin and the atmosphere will be 0.45 kilograms-force per square centimeter. Each engine provides 720 kilograms of air per hour, and the air taken into the air conditioning system will meet current requirements. The air conditioning system consists of two identical subsystems operating in parallel. The failure of one does not affect operation of the other one. The subsystems are linked by a crossfeed line which is used to provide air conditioning on the ground from the auxiliary power plant, engine startup from it and from ground facilities, and the startup of one engine from the other one. In order to reduce the effect of air bleeding on engine power and its economy, air is tapped in two stages and recirculated; the degree of recirculation is about 40 percent (1,100 kilograms of fresh air per hour and 700 kilograms per hour of recirculated air).

The Il-114's flight safety is provided for under natural icing conditions in all operating conditions by an air-frame deicing system which protects the leading edge of the wing and the tail assembly, the power plant air intake lips, and the cockpit windshield. The wing and tail section are equipped with an electrothermal cyclical deicing system with a heated "strip" which functions continuously. An electrothermal cyclical deicing system is also used to protect the spinner and blades of the propellers. The air intake of the engine nacelle and the engine's intake guiding device have a warm air deicing system which uses hot air from the engine behind the centrifugal compressor. The aircraft will be equipped with a warning and automatic control system for the deicing installations; it will switch them on and off automatically when icing zones are entered and left and inform the crew when icing begins and ends. The systems can be turned on manually if the automatic equipment fails.

The problem of providing reliable fire protection for the aircraft had to be resolved. In accordance with the results of a comparison of the centralized fire-extinguishing system (used on the Il-86 and the Il-96-300) and the self-contained system, the latter system was chosen for the Il-114; it has the advantages of reliability, convenience of operation, and the simplicity of the fire extinguishers and electrical circuits. Fire protection is ensured by the design measures which reduce the likelihood that a fire will break out in the aircraft's compartments and localize the fire in one compartment if it does break out, as well as by systems which warn of "overheating or fire," the appearance of smoke in compartments with the greatest fire hazard (the engine nacelles, the auxiliary power plant compartment, the baggage and cargo compartments), and by the availability in these compartments of self-contained and portable fire extinguishers and self-reacting switches for fire-extinguishing systems

when the aircraft lands with its gear retracted. Each engine nacelle and the auxiliary power plant compartment have two self-reacting fire extinguishers with remote control. This provides for two phases of fire extinguishing: the first works automatically when warnings are given by no less than two channels of the "fire" warning system, and the second phase is turned on manually. The fire system for the baggage compartments consists of smoke detectors, temperature sensors, and portable hand fire extinguishers.

### Operating Features

The aircraft's developers were faced with the task of providing for maximum structural simplicity with maximum reliability, as well as convenience of operation and maintenance. It is precisely for this reason, for example, that control is not servo-powered and the pumping stations of the hydraulic system do not require electricity in flight. The users of electricity operate only on the ground and during takeoff and landing, but to reduce the time to retract the landing gear, the power of both hydraulic systems is used by combining them temporarily through the coupling valve. Reliability and safety in operation are achieved through the airframe structure, which was developed in accordance with the principle of safe destruction and by providing for the fatigue strength needed to complete the service life specified. In addition, all the functional systems and units which affect flight safety have the necessary degree of redundancy, their structures make use of materials that have proved themselves well in operation, and systems have been configured so that the failure of one system does not affect another one. A printer is installed on board for day-to-day documentation of the failures and malfunctions; it produces a form with a listing of the systems and units that failed in flight for ground maintenance personnel and the crew.

In developing the aircraft, considerable attention is being given to reducing the noise in a locality as well as in the passenger cabin. This is provided for by using low-noise six-bladed propellers, by synchronizing their rotation in frequency and phases, by the large clearance—970 millimeters—between the tip of the propeller and the side of the fuselage, by isolating vibration in the interior panels of the passenger cabin, and by reducing the air velocity in the distribution mains of the air conditioning systems.

It may be affirmed that the entire complex of solutions incorporated in the structure and systems of the Il-114 and the extensive research and testing work and test stand refinements involved provide grounds to be assured of the aircraft's high economy, reliability, and safety, its ease of maintenance, and its competitiveness in operation.

Features incorporated in the construction such as significant load-carrying capacity, high maximum range, the capability of self-contained operation (without using

airport facilities) from relatively basic runways (including unpaved ones) under instrument weather conditions clear the way for development of a family of specialized modifications based on the Il-114 for the national economy; they should be able to meet the most diverse requirements and operating conditions, including conditions in the Arctic and Antarctic.

### Basic Specifications of the Il-114

Number and type of engines	(2) TV7-117
Takeoff power of each engine, in effective horsepower	2,500
Maximum passenger capacity	60 to 64
Maximum payload, in tons	6 to 6.4
Service range with maximum number of passengers, in kilometers	1,000
Service range with a payload of 1.5 tons, in kilometers	4,800
Cruising speed, in kilometers per hour	500
Flight altitude, in kilometers	8
Required takeoff distance, in meters	1,200
Required landing distance, in meters	1,300

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### Search for New Aviation Energy Source Examined 904H0173C Moscow GRAZHDANSKAYA AVIATSIYA in Russian No 3, Mar 90 p 29

[Article by A. Kulikov, doctor of technical sciences: A New Source of Energy"]

[Text] In science, it is very difficult to predict one future trend or another. It is not infrequent that related fields of knowledge make such a crucial contribution that they literally cancel out the traditional ideas. Won't chemistry have such an unexpected impact on aviation progress?

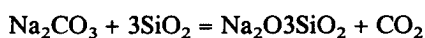
The search for a replacement for hydrocarbon fuel is under way on a broad front. Many are suggesting liquefied gas, such as hydrogen, as an alternative to it. This will be a discussion about a new energy source, a renewable energy resource. This concerns fuel obtained as the result of splitting high-modulus silicates under the effect of oxygen-free silicon compounds in a chain reaction, releasing a large amount of energy.

Let us remind the reader that not all silicates, only the high-modulus ones, just as not all elements in D. I. Mendeleyev's periodic system, just the complex ones, are uranium-containing and capable of being broken down by chain reaction. These silicates, like the elements in nuclear reactors, also may serve as a source fuel for physicochemical reactors in airliners and become a new source of energy for airplanes and helicopters.<sup>1</sup>

This analogy for a fundamentally new source of energy is a more graphic example: in both cases, energy is released when the initial substance is split under the influence of one reagent or another (in a nuclear reactor it is the neutrons, and in a physicochemical reactor it is the oxygen-free silicon compounds). However, the mechanism of the course of a chain reaction in reactors is different from that in substances. In the first case it is characterized by the interaction of physical particles (a material chain reaction), and in the second case it is determined by the level of energy-producing chains (an energy chain reaction). The principle of nuclear reactions is sufficiently familiar to most readers, but little has been written about the operation of a physicochemical reactor in the literature. For this reason, we will explain that a chain reaction develops here not through some physical particles (atoms, radicals of neutrons), but owing to the energy released in the reaction of a preceding chain. High-modulus silicates of the type  $M_2O\xi SiO_2$ , where M is Na, and K and  $\xi$  equal 3.4 (for example,  $Na_2O3SiO_2$ ), serve as the source substance in the physicochemical reactor. Silicon carbide SiC, silicon nitride  $Si_3N_4$ , or a mixture of them may be used as the splitting substance.

However, simply the presence of active atoms and radicals (in chemical kinetics), neutrons and other nuclear particles (in nuclear energy) of energy-producing chains and the active complexes of silicates (in chain reactions in silicates) is not enough for the process to become a chain reaction. The important factor here is the presence of a critical mass (of uranium, silicate, or any other substance). Creating a critical mass for silicates is not a simple task. For this reason, far from all silicates may be broken down by a chain mechanism. Fortunately, the silicate  $Na_2O3SiO_2$ , which has been synthesized by Soviet scientists and is being produced by domestic industry in quantities of 1.5 million tons per year under the name impure sodium disilicate (it costs 59 rubles 60 kopecks per ton) is suitable for this purpose. This will make it possible for designers to resolve the problem of developing airliners which operate on a new source of energy.

While the initial energy in uranium-containing elements has been completely agglomerated and concentrated by nature itself, in high-modulus silicates it is agglomerated and concentrated only partially in its natural state, and this process must be completed artificially from the initial substances. The artificial acquisition of splitting substances which are not contained in the earth's crust is well-known in nuclear engineering. The following reaction must take place to complete the agglomeration and concentration of silicate from the initial substances:



The ratio between the energy expended in completing the agglomeration and concentration to the energy released is 1 to 10 without the use of a sensitizer and 1 to  $2.5 \times 10^3$  with the sensitizer.

For the process of the silicate's breakdown to begin under the influence of the oxygen-free silicon compounds, input of the initial energy is needed from the outside. The original mass of the silicate in the liquid phase is changed to a critical mass. From here on the breakdown will result from the input of the heat which is released in the course of the reaction in forming the silicate described above.

The continuous input of heat and reduction of the critical mass of the silicates in the solid phase leads to an increase in silicate formation in the liquid phase. The result of this process is the emergence of new chains of decay in this silicate under the influence of the silicon carbide—in accordance with the chain mechanism, with the release of energy in geometric progression. It is not hard to notice that the "chemistry" of the chain process plays the role of a unique "stoker" in the breakdown of the critical mass. At the same time, new portions of silicate are released in the liquid phase, and this in turn leads to an avalanche-like flow of chain reactions with the release of energy. When the critical mass of the silicate is converted completely to a liquid state, by-products of the reaction are formed spasmodically and energy is released, which may lead to an explosion. So that this does not take place, the process of breaking down the high-modulus silicates and releasing energy and products of the decay, as in nuclear reactors, is regulated by rods made of oxygen-free silicon compounds by means of inserting and withdrawing them from the reactor's reaction zone. However, while inserting the rods in nuclear reactors reduces the coefficient of neutron multiplication and withdrawing them increases it, in reactors with high-modulus silicates it is just the opposite: inserting the rods increases the coefficient of the energy chains' multiplication, and withdrawing them reduces it.

The energy released by the breakdown of the high-modulus silicates may be transferred in an energy interchange circuit to an energy carrier such as the air in a gas turbine installation, for example. It is fully capable of supporting the flight of a modern airplane or helicopter. In addition, it may be possible to obtain higher parameters for aircraft, such as the weight features and fuel efficiency, in particular. This is ensured by the new fuel's higher calorific value (compared with kerosene). Thus, 8,500 kilocalories are released in the breakdown of a kilogram of the silicate  $Na_2O3SiO_2$  under the influence of silicon carbide. It follows from this that instead of the 39 tons of kerosene put into a Ty-154 airliner, only 130 kilograms of silicate are needed. The energy released in the course of physicochemical reactions is greater than the energy of a chemical reaction, but less than the energy of nuclear chain reactions.

A gas turbine aircraft with the new source of energy will not have combustion chambers and fuel capacities with all the attendant devices. The tremendous advantage of such aircraft lies in the opportunity to regenerate the reactors' fuel elements—similar to the regeneration of elements in nuclear reactors (at special regenerating



plants, though). And an aircraft with the new energy source will be put into use when a chain reaction is developed in a physicochemical reactor. To the degree that the silicates are broken down, the energy carrier (air) is fed by the compressor. At the starting moment, the energy carrier operates on "itself"—until the assigned parameters of the engine are reached. Then the unit begins providing thrust for the aircraft.

We also have to include the absence of an explosion and fire hazard and air pollution from the products of combustion among the advantages of airliners with the new energy source.

#### Footnote:

1. The mechanism for obtaining energy is set forth in more detail, for example, in an article in "Izvestiya AN SSSR, ser. Neorganicheskiye materialy" [Journal of the USSR Academy of Sciences, Inorganic Materials Series], Vol 20, No 1, 1984, p 111.)

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#### Aviation Tariff Issue Reviewed

904H0173D Moscow GRAZHDANSKAYA AVIATSIYA  
in Russian No 3, Mar 90 pp 30-32

[Article by V. Galkovskiy, lead scientific associate, GosNII GA [State Civil Aviation Scientific Research Institute], and candidate of economic sciences: "What Kind of Aviation Tariffs Should There Be?"]

[Text] The economic reform being carried out in the country requires revision and optimization of the entire system of wholesale, retail, and purchase prices, as well as the tariffs for transportation and other general services for the public. There is no question that this process is also affecting civil aviation in connection with the shift of its enterprises to full cost accounting and economic independence. Achieving this goal in air transport under the present system for setting passenger rates on domestic flights will be unnecessarily difficult.

The basic feature of the current system for such tariffs is its orientation toward excessively simplified arithmetical dependence in changing the revenue rate in accordance with the distance of a passenger flight. Let us recall that the revenue rate is constant up to 300 kilometers. It amounts to 4 kopecks for each kilometer on the route. Beyond 300 kilometers, the revenue rate is also stable. But for each subsequent kilometer it amounts to 1.667 kopecks. The total revenue rate per unit of travel over a long distance is derived from the ratio between the total fees before and after the 300-kilometer limits to the overall route of flight. The total revenue rate can be given an exaggerated outline in a graphic representation (See Figure 1). The graph's curve reflects the changes in operating expenditures of a hypothetical aircraft flying over a computed distance with a full load.

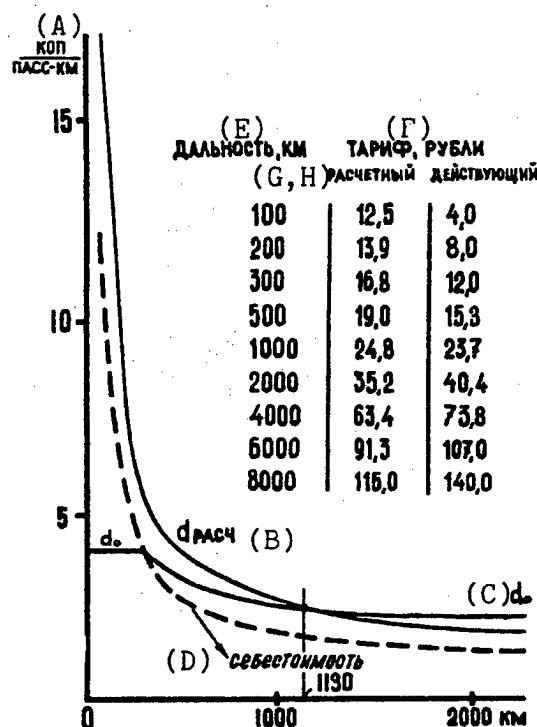


Figure 1. Change in the revenue rate in accordance with flight distance (fragment).

#### Key:

- A. Kopecks per passenger kilometer
- B. Calculated revenue rate
- C. Actual revenue rate
- D. Production cost
- E. Distance, in kilometers
- F. Tariff, in rubles
- G. Calculated tariff
- H. Tariff in effect

Without making a final judgment on the model presented for setting tariffs, let us note the following two conditions.

First. For any aircraft, even the lightest and most mobile one, there is a so-called zone of practical inaccessibility, that is, the area of an excessively short flight. Takeoff and landing distance is required to make a flight in this zone. But they mark only the beginning and final phases of flight and do not always coincide with the flight direction needed. As far as the distance of a flight is concerned, it is simply able to characterize a "step" in the network of airports on our country's territory. Thus, it is meaningless to "align" the tariff system to a zero or any other "beginning" distance which cannot have a practical relationship to operations. It must be oriented only toward a magnitude which corresponds to actual transportation service in effect in the network of Aeroflot's air routes. Let us also stress that, unlike the system of freight tariffs in rail transport, which incorporates a "minimum tariff distance" as a safeguard against the



burden of excessively short trips, the "minimum tariff distance" in aviation will characterize only the initial boundary of the zone within which passenger flights can be extended practically.

Second. As already pointed out, the evolution of the revenue rate according to distance relates to some hypothetical aircraft. Meanwhile, there are various types and modifications of aircraft involved which have differing technical and economic indicators. They will have their own individual curves for the change in production cost. Consequently, there is no need to demonstrate that the uniqueness of the geometric form of the revenue rate reflected in the tariffs, on one hand, and the multiplicity of production cost curves on the other hand inevitably give rise to contradictions between the expense and income levels of various aviation subunits which have chiefly one type of aircraft or another at their disposal.

At the same time, the systemwide nature of transportation tariffs cannot do without a certain averaging of the indicators for the various aircraft in use.

So what do we see as the opportunity and urgency for putting the air transport tariff system in order? The essence of our proposals comes down to the solution of a number of problems. They include correcting the dependence of the revenue rate on flight distance by taking into account the performance and economic features of the aircraft concerned; giving more thorough consideration to the territorial factor in the tariff; and increasing the influence of social factors on the establishment of differentiated tariffs as applied to specific directions.

Data from Aeroflot's annual study on passenger flights—by distance zones and types of aircraft, taking into account data on the average nonstop flight for each one of them—were used for the analysis and conclusions from the initial information. In this way we were able to reconstruct an approximate picture of the distribution of work by distances and types of aircraft at the same time. After this, the curves for the production cost of flights by distance were completed. Segments of these curves covered the entire range of possible distances. Each of the segments would represent its own sphere of influence. A representative aircraft was selected in an individual sphere. Its individual economic features were taken as the basis for establishing the relative operating expenses over this segment. The base level was subjected to further correction. This was done by weighting the individual indicators of the representative aircraft in the segment with aircraft of other types which also shape the segment's expense picture. The weighted segment curves for the change in production cost by flight distance were joined with those similar to them. This made it possible—after minor smoothing out (leveling) of the results where they were joined—to present an overall picture of the relative expenditures throughout the range of possible distances.

The results obtained, in turn, formed the basis for the curve showing the change in revenue rate by distance which is depicted geometrically in Figure 1 (curve B).

Three fundamentally important features, which are related both to a more precise definition of the relative expenses and a more accurate ascertainment of profit, were introduced in determining the revenue rates. So airport expenses were converted to a takeoff-landing, which is fundamentally important in reflecting the actual picture of the change in operating expenses according to flight distance. Then, taking the data on the representative aircraft as the basis, the individual level of the aircraft's annual use in flying hours is established and put into the calculations for each point of distance. Finally, fabrication of the profit for each flight was based on the maintenance of equal advantage. Unlike equal profitability, the principle cited assumes that only a special derivative magnitude, not the profitability given for each flight, is taken into account. Equal advantage is based on the establishment of a strict procedure for calculating the profit for a flight of any duration in precise conformity with the amount of guaranteed funds and the manpower resources involved. These indicators make it possible to establish the amount of profit in accordance with common coefficient-normatives which are characteristic for the Ministry of Civil Aviation as a whole. Extra charges of 6 percent annually were put into effect for the funds used. As far as labor inputs are concerned, we were able to make a judgment about them (with obligatory simplification) by the amount of the wages. The wages "extracted" from the total operating expenses for a flight of one duration or another served as the profit-shaping factor. The proportion of profit was established through the ratio which corresponds completely to the ratio obtained for the entire sector (the ratio of total profit, less payments for the funds, to total wages). The calculation made assumed provision for other actions not usually taken as well. Actions such as breaking down "other" the wages into constituent parts and allocating "direct wages" which can be completely applicable to a specific type of aircraft—wages for maintenance, for example.

Now let us return to the graph (Figure 1). In addition to the curve cited, curve B, which appears to realistically depict the change in revenue rate according to distance, a similar curve, curve C, is the one in use which is incorporated in the tariff system in effect. Both curves have only one common point: they intersect at a distance of 1,130 kilometers. This attests to the fact that passengers who go beyond the distance indicated (roughly 60 percent) are subsidizing those who are moved within the zone up to 1,130 kilometers (about 40 percent). So a passenger flying for a distance of 300 kilometers pays 4.8 rubles less, but one flying over a distance of 6,000 kilometers overpays nearly 15 rubles for his trip.

We have to dwell on the "0 to 300 kilometers" zone in particular. Judging by the large amount of direct and indirect evidence, the An-2 aircraft is practically the only "master" of this zone. However, this predominance is

not reflected in curve B; we were compelled to turn over the role of representative aircraft in this section to the An-24 aircraft and make use of its particularly theoretical indicators in this case. Theoretical because for aircraft of similar load-carrying capacity, the excessively short flights are not contraindicative so much as they assume loads appropriate for medium- and large-capacity aircraft. As far as the An-2 aircraft is concerned, its individual indicators proved to be so "unblendable" in the overall picture that if they are used it would be less expensive to pay for a 400-kilometer flight than one for even 100 kilometers, let us assume.

We have no aircraft at present which is capable of being entered in the theoretical curves for aircraft over short distances, and most of the "0 to 300" segment is essentially a "dead" zone unsuited for efficient operations.

It follows from what has been stated that today's model for setting tariffs "favors" passengers taking a trip up to 1,130 kilometers (and the less the distance, the more they are "favored"). And on the other hand, with an increase in the flight distance, despite the natural reduction in relative fees, the passenger overpays for a trip (the absolute amount of overpayment increases with the increase in distance).

Here we encounter the function of redistribution—an action quite widespread in any society. It is doubtful that this action has been socially justified from the beginning. But if it is viewed from the position of the objective expenditures which subunits of the Ministry of Civil Aviation bear, it looks downright contradictory. The development of demand for flights over distances which involve increased financial losses is stimulated by it. Moreover, the full potential of aircraft which is incorporated in their design is not revealed under such conditions.

Bringing the existing system of tariffs into conformity with the objective economic indicators of the technological processes being provided for will not be complicated. But the point is that roughly 40 percent of everyone making use of air transportation have historically been accustomed to not paying enough for a trip, just as the remaining 60 percent have been overpaying for it, without suspecting or complaining about it. Consequently, improvement in the tariff system will take on a sharp social tone. Most passengers will be tacitly satisfied, but a minority will actively protest an increase in prices. The paradox is that the tariff system in effect, which was oriented at one time (long before the last change in the tariffs) mainly toward the development of transport in the zone of short distances and is clearly incorrect and economically detrimental because of it, appears before us as almost an ideal compromise under the conditions created by it.

However, we should not be deterred by this circumstance. In concerning ourselves with the efficient economic development of air transportation, we are obliged to correct the mistakes of the past. And not to be apprehensive about breaking away from the current model for setting tariffs. But naturally, solution of the problem cannot be limited to tariff changes alone. A way

out of the situation must be sought in a combination of measures. And chiefly not so much by reducing service as much as possible on short routes which are linked by other forms of transportation as by closing the airports and landing fields which function "in parallel." This is a socially difficult task which requires rather long periods of time to carry out, for this involves job placement for the maintenance personnel that are released.

Increasing the tariffs for short routes is unquestionably necessary. Though differentiation in the transportation fees in accordance with their social importance is considered no less important in the various reports. And with the aim of achieving socially just conditions for the public in those regions which objectively must use only air transportation (mountain villages, tundra and island settlements, and other places that are remote and not easily accessible). Where there is no alternative to air transportation, it is contraindicative to abuse its monopoly. On the contrary, sometimes even lower tariffs will have to be set.

In other words, the system of air tariffs for passengers does not have to be reduced to an oversimplified model, by unifying and leveling everything, to create as much convenience as possible for the rate setters and to meet the formal conditions for cost accounting. The system must be "adjusted" to the needs of the clients and modified in accordance with changing conditions.

How is all this to be integrated into cost accounting? The main point here, in our view, is that we have to approach it, but not ("prepared") to resist it. At the same time, subsidizing and redistributing actions cannot be avoided, since they can hardly be considered as shortcomings of the new mechanism of economic operation. After all, by being exceptionally apprehensive about production indicators, you will not achieve the desired result in dealing with live (personal) demand. The latter will behave in its own way, without taking production workers or interests into account. The shortage in supply has trained production that everything is permissible because everything is consumed. However, everything promises to remain in place not only until the deficit is eliminated, but until the time that the entire system of prices and tariffs is brought into conformity with the true value (cost) of goods and services.

A few words about the problem of territorial differentiation for tariffs. The existing demarcation of the country's territory into two tariff zones (two groups of air routes) is the first timid and not very successful attempt to reflect differences in the natural-geographic and economic spheres in the cost of transportation with certain technological components of air transport services. The actual diversity of features is so extensive that dividing our vast country into just two zones (which means that each one of the zones has the same tariffs) is only a concession to simplification of the tariff system. This was done not to please clients and a production subunit, but for the convenience of a department's management apparatus.

Let us note this nuance as well. For most of the forms of land transportation, the cost-forming bases have been

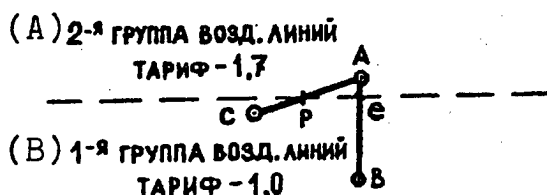


Figure 2. The influence of route geometry on tariff formation.

Key:

A. Second group of air routes, tariff correction factor 1.7

B. First group of air routes, tariff correction factor 1.0

tied both to the means of transportation itself and the facilities provided for it to operate (the bed for railroads, highways). But for air transport, the territorial aspect as such does not assume a spatial dimension. It is linked only with the "point" cost-forming basis—airports. But the category of territoriality, which is a synonym for duration of movement under certain domestic and economic conditions for all forms of transportation, also has a relationship to air transportation. But chiefly only in the area of price setting for the fuel consumed, which is differentiated by the conditions for its delivery to airports. The system for taking this factor into account is too imperfect here as well, even if we acknowledge the corrected division of the country's territory into the two zones cited.

Look at Figure 2. Airport "A," located in the zone for the second group of air routes, is linked by air with airports "B" and "C," which are in the first group of air routes and are equidistant from "A." The amount of fuel and its cost from flights "A-C" and "A-B" will be identical. But the tariff for "A-C" will prove to be substantially higher than the tariff for "A-B," since the "A-p" and "A-e" sections are paid for with the correction factor "1.7."

As far as the ground service expenses for aircraft and passengers at airports in the two tariff zones are concerned, along with the objective difference in work conditions (but not equal everywhere in either zone), the volume indicators of airports' workloads influence the cost of service the most. For this reason, we cannot rule out the possibility that expenses for ground service at airport "A" may not be higher, but lower, than at airports "B" and "C."

What measures should be coordinated to get out of this situation?

We think that they should be especially organizational, first of all: all Ministry of Civil Aviation airports ought to shift to the system of presenting bills for service provided, which is customary throughout the world. This will make it possible, first of all, to give a substantial part of the so-called "indirect" expenses, which are now dissolved in "airport" and "other wage" items, the completely tangible character of the "direct" expenses incurred for one flight or another—just as we regard expenses for "amortization" or "wages for LPS [flying

personnel]." Secondly, this makes it possible to classify all airports in independent groups according to the cost of services and the proportionate expenses for flights between airports in different groups. Only in this case can the question of the territorial differentiation of tariffs be shifted from the category of what is speculative and acquire completely practical objective bases for its favorable solution.

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### Test Pilot Bliznyuk's Career Highlighted

904H0222A Moscow PRAVDA in Russian 8 May 90  
Second Edition p 6

[Article by V. Chebakov: "The Firm Guarantees It"]

[Text] Honored Test Pilot of the USSR Stanislav Bliznyuk of the OKB [Experimental Design Bureau] imeni S. V. Ilyushin was recently awarded the title of Hero of the Soviet Union for the courage and valor he displayed in testing Soviet aircraft.

"Let's start off slowly." Many times I have heard this calm statement from Bliznyuk in the earphones before takeoff, when the crew of the Il-76 aircraft was dropping cargo for the drifting and polar stations. A new technique for delivering equipment, products and fuel with the aid of parachute systems was being perfected. This method has become routine in the national economy today. And Bliznyuk and his crew performed a great service in this.

What attracts one to this person most of all? He is of medium height and he does not look strong. At times he appears to be gloomy, dissatisfied with something. But this is before the first conversation. Bliznyuk is a sociable, interesting man with a sense of humor.

Test pilots of the OKB Ilyushin completed a nonstop flight from Moscow to Yuzhno-Sakhalinsk in the new Il-96-300 today. I come down the ramp surrounded by pilots and technicians of the Sakhalin Aviation Enterprise. The crew and those in charge of the flight come down the ramp after me.

"But where is the aircraft commander?" asks a local reporter.

"That is probably him there, in the peaked cap," a colleague answers.

"No it isn't," I tell both of them. "Look next to him, in the blue shirt, with a tie and leather jacket."

"It can't be," the reporters say with amazement. "And this is a Hero of the Soviet Union! We should ask someone for a peaked cap to put on Bliznyuk, or else the chief pilot will look very unassuming in the photographs."

Genrikh Novozhilov, general designer of the OKB imeni Ilyushin: "He is very unassuming, first of all, like his predecessors as chief pilot, Twice Hero Vladimir Kokkinaki and Hero of the Soviet Union Eduard Kuznetsov. The title 'chief pilot' exists in all firms, both here and

abroad. It is a pilot of the highest qualifications, capable of performing very difficult work by paving the way for a new aircraft.

"Bliznyuk is a very disciplined person, and he meets all of the demands made upon the firm's chief pilot.

"You realize that this title is not awarded for developing new aircraft or for the length of service as a pilot. Persons receive the title of hero because in certain situations which could lead to people being killed and an aircraft being destroyed, this person saves lives and an expensive aircraft by his skill. The title is awarded for courage and skill in extreme situations..."

Genrikh Vasilyevich told how as chief pilot he performed an aerobatic maneuver—a "roll"—in the military modification of the Il-18. In such a huge thing! After these regimes, the aircraft had to be written off. But this flight gave the designers invaluable material...

Stanislav Grigoryevich was born in Leningrad. He lived through the many days of the blockade there. In the spring, when [Lake] Ladoga was opened, they took him and his mother to the mainland. They went to his grandmother in Petropavlovka and they found themselves in the hell of the Battle of Stalingrad. In 1945 they moved to Moscow.

"The first aircraft I took off was a Yak-18," Bliznyuk says. "In 1952 I was a student in a branch of the Serpukhovo Aeroclub in Tsaritsyn, near Moscow. I had a marvelous instructor, Dmitriy Artemovich Lemesko, with whom I made my first flight in July 1953. Then the naval flight school in Leningrad, and a year afterward in Yeysk, where I flew the Yak-18 and Yak-11. I began familiarizing myself with a jet, the MiG-15. And it did not stop here..."

Student Bliznyuk had an expression darker than a storm cloud. What a shame! Everyone was flying, but landings were not turning out for him. No matter what he did. But he met the regiment commander, Davydov, on the airfield here.

"What do you mean, it's not turning out?" he asked, astonished. "Well, get in the airplane."

The commander made three absolutely identical landings with the student. And after the third landing it was as if blinders had been removed from Stanislav's eyes. He began flying so well that they kept him as an instructor.

"But I didn't want this," Stanislav Grigoryevich continued. "I was dreaming about the Northern Fleet and flights over the ocean. Then everything in my life went wrong: I was caught by the cutback. At age 24. What should I do? I knew there was a school for test pilots, but I had not accrued enough flying hours. So was I wide of the mark?"

Reserve officer Bliznyuk joined Aeroflot. He worked at Vnukovo in a ground maintenance group. He was a

military pilot, and for almost a year he counted hangers in cabins, and he issued them and accepted them... But he could not resign himself to this. He obtained an assignment to Ulyanovsk, to the higher training school of the Ministry of Civil Aviation. He became a copilot on an Il-14. But soon afterward he got into the school for test pilots. There was a magnificent trio in the group—Igor Volk, now a pilot-cosmonaut of the USSR, Boris Orlov, an honored test pilot, and Stanislav Bliznyuk, also an honored test pilot now.

"I was always a fighter pilot." Stanislav Grigoryevich says. "But..." Again there was this "but." "My ear began to ache, and the speeds and altitudes were such that they would not allow it for health reasons. I switched to heavy aircraft. Thanks to Vladimir Konstantinovich Kokkinaki, they accepted me at the Ilyushin firm. I have been working for them for 25 years now. I flew the Il-18 and tested other aircraft. It was only after 17 years that I took off my first experimental aircraft, the OES-1. Then the Il-96, which I am working with now. I have flown over 30 types of aircraft altogether."

"A test pilot must be under considerable psychological tension in such a life."

"It is not always the same. The stresses come in 'pieces.' There is the expression 'superstall.' There have been three in heavy aircraft in the entire history of aviation. Two of them ended in catastrophe. Mine, the third one, turned out, as you see. But there are many unexpected events in general, and not just in the cockpit. In a motor vehicle as well."

"What was your most unusual flight?"

"A landing on King George Island in the Antarctic, where an airfield for the Chilean Air Force is located. Today I look at a videotape and I live through it. The runway is 1,230 meters long, very short for an Il-76. We prepared for a long time. Our Chilean colleagues helped a great deal. They even found the engineer who built this strip. Some Chileans told me: 'Change your mind, you'll run off!' Finally one young pilot sensibly explained what kind of surface the runway had. What did we do? We reduced the pressure in the tires and reversed the engines while we were still airborne. This had never been done with this aircraft. We even opened the side doors: like protruding 'ears,' they would increase the drag. And everything turned out. When the aircraft stopped, there were 400 meters left to the end of the runway. This was a difficult but very interesting trip. Perhaps the most interesting in my life."

**Igor Vorobyev, deputy general designer for flight testing work:**

"The fate of any new aircraft depends on the testing. A good aircraft with excellent features will not get into series production if the test pilot permits an unwarranted error. There have been such cases. Bliznyuk is a person

who can be trusted with any assignment. And his performance will be of high quality. He is dependable for everything..."

Once again Stanislav Grigoryevich has told us little about his work because of his modesty. After all, the Ilyushin firm stands for more than civil aircraft. It is also working for the country's defense. Thinking about this, I automatically visualize an Il-76 military transport piloted by Bliznyuk flying past at treetop level. A tank-borne assault force! But we will talk about this the next time, some day.

### **Aviation Industry Minister Interviewed on Hannover Show**

904H0222B Moscow PRAVDA in Russian 24 May 90  
Second Edition p 6

[Interview with A. S. Systsov, USSR minister of the aviation industry, by PRAVDA correspondent Ye. Grigoryev: "The Airplane of the Future"]

[Text] Bonn, 23 [May]—"A Soviet aircraft with a hydrogen engine became 'the star' of the International Aerospace Exhibition in Hannover." This high assessment was seen time and again in the West German press.

When the experimental Tu-155 arrived at Hannover's Lagenfeld Airport, "a crowd" of specialists did not gather around it, in fact. The point is that designers in the FRG are working on a similar "airplane of the future." However, as one West German expert noted, the A-300 Airbus with such an engine was shown only as a model at the exhibition, but the Tu-155 has been flying for two years.

"It may be stated without exaggeration that the Hannover exhibition turned out to be very productive for us," A. S. Systsov, USSR minister of the aviation industry, said in summing up the results. "Serious negotiations were held with American, British, and West German firms. An agreement was signed with West German aerospace industry enterprises on joint development of an aircraft powered by cryogenic fuel."

Interest in the Tu-155 is not coincidental. A sharp increase in world passenger flights is expected in the foreseeable future. It is assumed that the fleet of passenger aircraft will increase by 2 to 2.5 times as much. This can lead to serious pollution of the planet's airspace. But engines that operate on liquefied gas will make it possible to adhere to ecological requirements. And economy will be ensured. Liquefied gas is roughly half as expensive as kerosene, and the reserves of it are much larger than oil reserves. So we came to an agreement to jointly develop the design for an aircraft with these engines. Other countries may also take part in the Soviet-West German cooperative arrangement in the future if they wish.

What was instructive for us in Hannover? The minister thinks that the new cabin for the West European Airbus

shown at the exhibition was interesting. An unusual layout, a bold design, and innovative designer solutions. But mainly the so-called "business" aircraft were exhibited here. These are aircraft for a few passengers which are in wide use in the West, chiefly by business circles. Why don't we build them?

"We did not have the capabilities for this before," A. Systsov answers. "But now the Sukhoi Design Bureau is developing a supersonic business aircraft for 8 to 10 passengers together with the American Gulfstream firm. Negotiations are under way with the French Dassault firm on the joint development and production of the Falcon-2000 business aircraft. In addition, we are planning an air taxi aircraft. The conversion is making it possible to develop this type of small aircraft."

### **Air Transport Protocol Ratified**

904H0222C Moscow IZVESTIYA in Russian 30 May  
90 Morning Edition p 5

[Interview with M. A. Timofeyev, deputy minister of civil aviation, by IZVESTIYA correspondent B. Ivanov: "The Right to Fly Without Risk"]

[Text] The USSR Supreme Soviet ratified a special protocol the other day to add supplements to the International Civil Aviation Convention. This convention, signed in Chicago in 1944 and adopted later by the International Civil Aviation Organization (ICAO) as its regulations, establishes basic air transport rules and defines the principles for cooperation among states in this field.

An IZVESTIYA correspondent asked M. A. Timofeyev, the USSR deputy minister of civil aviation, to comment on the Supreme Soviet decision.

[Ivanov] Mikhail Aleksandrovich, what is purpose of the supplements approved by the USSR people's deputies? What made it necessary for them to be drafted and approved at this particular time?

[Timofeyev] The point is that the Chicago convention was drafted 46 years ago when many of the problems that are now on the agenda simply did not exist. For this reason, it is quite natural that amendments and changes are made periodically to this basic document for the ICAO. The current supplement—Article 3B, approved at an extraordinary session of the ICAO Assembly in May 1984—is one of the important measures aimed at improving flight safety, providing full assurance of passengers' right to use air transportation without risking their lives. The essence of this article is as follows: countries taking part in the Chicago convention assume the obligation, when a foreign civil aircraft has illegally crossed a border or deviated from airways, of acting in a manner so as not to threaten the lives of those on board the airliner and to maintain the safety of the aircraft itself. Moreover—and this is perhaps the main point, they are obligated to refrain from the use of weapons, that is, not to open fire on civil aircraft. Of course, this key provision of the article is tied in with a number of

commitments which states have assumed. They have been called upon to prevent situations in which civil aircraft can turn up in foreign airspace or be used for military or other illegal purposes.

Now, on the second part of your question. The idea for such an amendment emerged in the ICAO after the well-known incident involving a South Korean Boeing 747 airliner which was shot down in Soviet airspace by our interceptors in 1983, as a result of which the passengers and crew were killed. I will not return to the complicated and intricate circumstances of this affair now. I will say only that if there had been clear-cut legal regulation of action by the sides concerned in situations such as this at that time, the tragedy might not have happened.

[Ivanov] So why are we only now ratifying this amendment, 6 years after the protocol was signed?

[Timofeyev] There were reasons for this. Just remember the complicated and tense situation in the world in the early 1980's, marked by suspicion and distrust. At that time our actions, including in the solution of many international problems, were determined by numerous stereotypes which developed and were approved during the era of stagnation. From the vantage point of the realities and thinking of today, it is distinctly apparent that the probability of breaking away from the deeply ingrained outlook at that time was highly illusory. For this reason, it is not surprising that our leaders at that time were looking at the question of adherence to this amendment very warily.

[Ivanov] When will it come into effect?

[Timofeyev] The protocol must be ratified by 102 of the 162 ICAO member countries for this. At present, the parliaments of only 54 countries have approved the amendment. As we see, the ratification process is proceeding quite slowly. However, a nuance of no small importance needs to be taken into account here. Many countries appear to be reserving their position and are in no hurry to make it known while they wait for specific steps from the major aviation powers, chiefly the USSR and the United States. Why? Because in recent years we and the Americans have been involved in one way or another in incidents in which weapons were used against civil aircraft.

[Ivanov] What incidents are you referring to?

[Timofeyev] For example, the case in April 1978 when a South Korean Boeing 707 was thrown off course and showed up in the Kola Peninsula region. All the attempts to take it out of our airspace were futile, and then we opened fire. The airliner was damaged and made a forced landing. Fortunately, none of the passengers or crew were injured. Another case. In July 1981, our interceptor shot down an Argentine airline transport aircraft headed for Cyprus, but which ended up over Azerbaijan, instead of in Turkish airspace, because of a

navigation error by the crew. And of course, the incident involving the South Korean Boeing 747 which I already mentioned.

In each of these cases, a situation developed in which aircraft of foreign powers intruded into our airspace and remained there for a definite period of time, as a result of which the PVO [Air Defense Forces] were forced to stop their flights. I do not wish to say that we have worked out specific conduct in episodes of this sort; every incident has its own conditions and specific features, and we naturally have not opened fire on every trespasser. However, the general approach to such extraordinary situations has been the same—forceful. As far as the United States is concerned, everyone obviously remembers the tragic events of July 1988, when a missile from the American cruiser Vincennes destroyed an Iranian airliner carrying passengers over the Persian Gulf.

[Ivanov] In other words, the USSR's adherence to this protocol essentially means a change in the fundamental approach to such situations and would entail completely different actions on our part when a civil aircraft violates Soviet airspace...

[Timofeyev] Absolutely correct. The principle of assessing actions in such cases is changing as well. We are introducing a more humane and flexible policy; we are moving away from the practice of interpreting such events in black and white—"ours" and "foreign," as a rule, which has also predetermined the nature of the decisions made and naturally, has depleted the arsenal of means of possible reaction to one incident or another.

[Ivanov] But the question arises quite naturally in this connection: won't the amendment ratified by the Soviet Union make it difficult to protect our airspace border?

[Timofeyev] Of course not. The border will remain "under lock and key." There can be no question of any kind about this. We must also take into account that Article 3B clearly and unequivocally specifies: any aircraft that violates the sovereignty of another state is obliged to comply with the order transmitted to it to land immediately at the place indicated or to obey other appropriate instructions to put an end to the airspace violation. In such a situation, the states may resort to any means compatible with the standards of international law. However, something else is important in this case as well—that such means are in keeping with the nature of the violation. If some amateur pilot in a small sports aircraft accidentally crosses our border, for example, it is scarcely necessary to shoot it down. The circumstances may be different, of course... But in any event, the degree of punishment for such violations should only be determined by a court, as it was in the Rust case, incidentally.

In my view, in deciding what to do with an airspace violator, it is important that a basic human value—a person's right to life—is observed and respected.

### Sheremetyevo-1 Reconstruction Examined

904H0222D Moscow IZVESTIYA in Russian 18 Apr 90  
Morning Edition p 6

[Article by V. Belikov and Ye. Piskunov: "The Rebirth of Sheremetyevo-1"]

[Text] Beginning in the last 10 days of April, the Sheremetyevo-1 Air Terminal for domestic flights will be handling international charter flights, ones that are not regularly scheduled.

This terminal has been included in Aeroflot's foreign operations because of the pressing need to relieve Sheremetyevo-2, the country's main air "gates" to other states. After over 10 years of operation, the terminal has already exhausted its capacities and cannot cope with the ever-increasing passenger flow. At the same time, the two available runways and the airport services will be quite capable of handling airliners for no less than another 15 years after the appropriate modernization.

The International Air Services Central Administration (TsUMVS), the manager of the Sheremetyevo Airport, has decided to extend its active life. Fundamental reconstruction is being begun, and the entire Sheremetyevo-1 complex will be expanded and operated with modern technology later on. The Soviet-West German joint venture "Aeroflot-Lufthansa and Partners" was recently established for this. In addition to the two airlines, well-known FRG firms—the Frankfurt-on-Main Airport, the AEG firm, which makes electronic and electrical engineering equipment for airports, and the (Zalzgitter) association, which built Sheremetyevo-2—are also taking part in its activity. The very large Dresdnerbank, through which the entire Sheremetyevo-1 renovation project is being financed at a cost of 750 million West German marks, is also taking part in the joint venture.

V. Potapov, first deputy general director of the TsUMVS:

"Our administration, which is not applying for aid from the state, is receiving credit abroad; it has a commitment to repay it later on from the funds it will receive from foreign airlines by providing them with a broad range of services in an up-to-date airport. I will also note that this service, at the level of generally accepted world standards, will be extended to all passengers without exception—foreign and Soviet citizens on international flights, as well as to our air travelers departing on domestic air routes from Sheremetyevo-1."

It is expected that after completion of the renovation in 1995, the airport's throughput capacity will increase significantly, reaching 15 million passengers annually at the turn of the century.

What will the renovated Sheremetyevo-1 be like? V. Tumanov, deputy chief of the airport, tells about this:

"By the beginning of next year, the joint venture intends to carry out the urgent reconstruction work. The existing air terminal building has to be expanded and replanned

without stopping passenger service. At the same time, the first section of a cargo complex, as well as a building for repairing heavy airport machinery and equipment, will be erected. Incidentally, these shops will be able to fill any orders from other organizations to recondition equipment, adding to the joint venture's income."

The second stage of the renovation includes the construction of a large new air terminal building with a control tower, an apron for aircraft with a centralized refueling system and construction of a spacious hangar, designed for maintenance of the largest aircraft. We should particularly point out that three spacious, first-class hotel buildings for passengers on domestic and international flights are to be erected near the terminal. The new cargo complex and repair base will be fully completed in the same period.

The signature of (H. Runau), chairman of the board of directors of the Lufthansa airline, is on the agreement to establish the joint enterprise:

"Our airline," he says, "will take part in equipping Sheremetyevo-1 with all kinds of modern ground mechanization, as well as radio navigation equipment, which will transform it into practically a world-class all-weather airport."

We will share experience with our Soviet colleagues in operating various types of installations and skills in selecting and training ground service personnel. We are beginning the training of specialists of all levels, from ground equipment drivers to managers of the hotel complex subunits, at our Lufthansa training center. A similar center is being established at Sheremetyevo, where Soviet and West German instructors and teachers will be employed.

In conclusion, H. Runau discussed the prospects for the "Aeroflot-Lufthansa and Partners" joint venture's activity, noting that construction and modernization of airports in other cities of the Soviet Union are being contemplated.

## MOTOR VEHICLES, HIGHWAYS

### Kama Truck Plant Being Transformed Into Joint Stock Company

KamAZ Director on Change

904H0221A Moscow PRAVDA in Russian 21 May 90  
Second Edition p 2

[Interview with N. Bekh, general director of the Kama Heavy Motor Vehicle Association, by PRAVDA correspondent N. Morozov: "'KamAZ' Stock Shares"]

[Text] Naberezhnyye Chelny, Tatar ASSR—An important event has taken place in the life of the Kama Heavy Motor Vehicle Association. The largest enterprise in the sector is being converted into the "KamAZ" [Kama Motor Vehicle Plant] Joint Stock Company. In this connection, I



am asking N. Bekh, general director of the enterprise, to answer several questions related to this most important event in the life of the collective.

[Morozov] Nikolay Ivanovich, why was your association chosen for the economic experiment?

[Bekh] First of all, we must make it clear that no one imposed this choice from the top. Our collective and the Ministry of Automotive and Agricultural Machine Building proposed the change in our association's status to the USSR Council of Ministers.

What was the basis for raising the question of converting a state enterprise into a joint stock company? It is common knowledge that Kama heavy vehicles have been put on the world market. However, in order to make them more competitive, we have a great deal to do to improve them, to update the technology, and to resolve a number of social problems. Large sums of money are needed for these purposes: no less than six billion rubles will be required until the year 2000; this is roughly equal to the cost of the fixed capital of all 13 plants. Our economists have estimated that we cannot achieve these objectives through self-financing. It is not realistic to count on the state budget either, as you understand. We are left with hope for resources in the financial market. Many enterprises and organizations, including the customers for our products, have funds which they are prepared to invest in development of the KamAZ. With the transfer of state ownership to joint stock ownership, we have the opportunity to interest foreign firms with freely convertible currency.

[Morozov] Who can become a participant in your joint stock company?

[Bekh] Practically anyone who wants to. But more specifically, state, cooperative and other public enterprises, associations and organizations, members of labor collectives in the stock company, individual citizens, and foreign individuals.

[Morozov] An important factor: how will the shares be distributed?

[Bekh] Shares with a face value of no more than 49 percent of the company's authorized assets are to be put on sale. The remaining shares are the property of the USSR.

[Morozov] So the company does not have complete freedom of economic action, all the same?

[Bekh] Well, why not? It is another matter that the right to control half of the package of shares belongs to the state, which is a participant in the joint stock company with equal rights. Our company will begin operating as an independent production complex on the basis of its charter and the decree on economic activity. The company builds up its portfolio of orders independently, and works out and adopts a development plan based on state orders, contracts for the delivery of products, analysis of the market situation, and the rates of tax payments.

Stockholders independently determine the types and volumes of output and select the customers, and of course, the company itself determines the structure and size of the work force and makes decisions on questions of wages and economic incentive, social development, and production modernization.

[Morozov] And relationships with the foreign market?

[Bekh] The "KamAZ" Joint Stock Company has the right to engage in import-export operations independently.

[Morozov] What about taxes?

[Bekh] The company pays for manpower and natural resources, makes rent payments, and pays the tax which regulates the expenditure of funds aimed at consumption, as well as the tax on profit in accordance with wage rates. At the same time, the tax rate entered in the republic budgets of union and autonomous republics and local budgets will be determined by the RSFSR Supreme Soviet, taking into account the stockholders' expenditures for development and maintenance of the infrastructure of the city of Naberezhnyye Chelny and the reproduction of manpower resources and environmental protection activity. The company pays the budget a sum in the form of a tax which is equal to the difference between the extra tax on profit and the sum of dividends which go to the state in the joint stock company. Certain tax advantages are being allowed for the first 2 years of activity.

[Morozov] And a final question: what is the mechanism for management of the "KamAZ" Joint Stock Company?

[Bekh] The highest organ of management is the general stockholders' meeting. All decisions are made by voting. But the highest elected organ—the company's board of directors—is in charge of all "KamAZ" property and assets.

### Economic Reform Commission Official

904H0221B Moscow IZVESTIYA in Russian 30 Jun 90  
Morning Edition p 4

[Interview with G. Melikyan, deputy head of a consolidated department of the State Commission on Economic Reform under the USSR Council of Ministers, by V. Romanyuk: "Shares of Stock in the KamAZ [Kama Motor Vehicle Plant] Are Being Sold"]

[Text] The USSR Council of Ministers has approved a decree transforming the "KamAZ" Production Association into a joint stock company.

This question was raised in IZVESTIYA several days ago: "Will the KamAZ become a joint stock company?" We can definitely answer this in the affirmative today: it will! And it means that we will put an end to the predatory policy of the departments that consider the



giant enterprise as a reliable "donor" for the support of numerous ineffective production facilities in the sector.

"After reviewing the concept of a shift to a market economy in the USSR Supreme Soviet," explained G. Melikyan, deputy head of a consolidated department of the State Commission on Economic Reform under the USSR Council of Ministers, "the government was instructed to work out a program which would make it possible to speed up this process. The provision on joint stock companies establishes the conditions for the denationalization of property, without which the shift to a market is impossible. The transformation of the KamAZ into a joint stock company will become the first serious step in this direction."

[Romanyuk] And who is the fortunate holder of the shares?

[Melikyan] This is the procedure: the state transfers the property to the joint stock company's ownership, and in exchange it receives shares for the full value of the enterprise—roughly 4.7 billion rubles.

[Romanyuk] What is changed as this takes place?

[Melikyan] First of all, the legal status of the enterprise, which was not on the Lvov "Production Line," incidentally. A joint stock company is not subordinate to anyone—just the owner.

[Romanyuk] In other words, the state, or even more precisely, the ministry...

[Melikyan] Indeed, the ministry receives the controlling shares for the present, and along with them, the right to dictate its will, to an even greater extent than before. The ministries have seen this as a method of prolonging their existence. In order to avoid such a situation, an alternative was adopted for the KamAZ: of the 51 percent of the votes which belong to the ministry at a shareholders meeting, half are delegated to the labor collective.

[Romanyuk] Gennadiy Georgiyevich, you speak about the controlling shares. But won't the state really own even more than that?

[Melikyan] Initially, yes. It is not so simple to sell off even half of such a vast sum. But note also that the KamAZ joint stock company did not have a broad presentation, and there are already buyers for 1.5 billion rubles. (Compare: over the two years in which the joint stock economy was developed in the country, the shares of labor collectives issued totaled 600 million rubles altogether). And while previously only the employees of a given enterprise could be owners, anyone who wishes to will be able to acquire KamAZ shares—juridical persons, including foreign companies, and ordinary citizens. KamAZ employees receive priority in acquiring shares, but according to estimates, more than five to seven percent of the collective's members cannot cope with it initially. The mechanism incorporates various kinds of incentives which provide inducement to accrue the authorized capital and to sell as many shares as

possible. Though there is a condition: all the shares sold to private individuals should be nominal. This is a concession to those who have expressed apprehension that shady business operators would "launder" the incomes. But I think it would be better if the "shady operators" legalized their capital—at least they would begin to pay taxes.

[Romanyuk] A considerable number of the shares probably will go to industries associated with the automotive giant.

[Melikyan] Yes, motor transport organizations and lumber enterprises have expressed considerable interest in the shares. This gives them the right to have priority in acquiring the trucks. But not only that: they are hoping to have an influence through the council on the production—the structure and technical qualities of the trucks. Foreign firms have also expressed the desire to obtain shares. KamAZ has real capacities and prospects for development. Yes, it needs additional capital investments, and construction of part of the complex has not been completed yet. The fact that in earning 1.5 billion rubles for the treasury in the current five-year plan KamAZ still owes the banks 400 million really defies economic logic. There is nothing to be surprised about here. In this year alone, the ministry intends to immobilize 230 million rubles in centralized funds. In order to get rid of all these requisitions, the collective managed to shift the enterprise to the new tax system on 1 July 1990 instead of 1 January 1991.

I think that joint stock companies will become the predominant form of economic operation in the market economy. First of all, this form makes it possible to mobilize funds for the solution of pressing production problems. We can resort to credit, but credit must be returned. Secondly, the joint stock economy creates the conditions for a rapid transfer of capital from one area to another. Unfortunately, we do not have a stock exchange yet or stock quotes, and hence a tool for calculating the course of the shares. But this is important, inasmuch as the fall and rise in shares indicates which production facility is promising and which one is not.

[Romanyuk] All the same, I would like to return to the question that is repeated in many readers' letters: won't the "shady operators" or the Western businessmen buy up the stock shares of our enterprises? They will begin implanting their own procedures and casting people outside the gates...

[Melikyan] If only they would buy them up! They are in no hurry. The purchase of Soviet stock shares by Western business people is not only an investment in our economy. It is also the importation of advanced technology and Western experience, including experience in conducting a market economy. It is another matter that social protection should be ensured for the people. Except for loafers and slipshod workers, of course.

[Romanyuk] Who comes after the KamAZ?

[Melikyan] Evidently the Gorkiy Motor Vehicle Plant. There are quite a few who want to shift to a joint stock economy in the Ukraine and other republics. I do not think the decision should be made by the USSR Council of Ministers each time—the matter should be decided by the ministries and republic organs, and even by local soviets if an enterprise is under their jurisdiction. Incidentally, the joint stock form of ownership makes it much easier to overcome conflicts between the center and the republics. And if the question of dividing up the property of the union, the republics, and the local soviets arises, the shares must be divided by transforming the state enterprises into joint stock companies. In many respects, the subject of dispute will then disappear.

### **AZLK Motor Vehicle Plant Highlighted**

904H0231A Alma-Ata AVTOTRANSPORT  
KAZAKHSTANA in Russian No 5, May 90 pp 1-3

[Article by A. Pugayev: "The AZLK [Moscow Motor Vehicle Plant imeni Leninist Komsomol]: From the 'KIM' to the 'Aleko'"]

[Text] A story about the Motor Vehicle Plant imeni Leninist Komsomol probably should begin with a sentence such as this: "In recent decades this plant has lost its prestige and has been in a state of stagnation." But we cannot bring ourselves to blame the collective and its brain center—the designers, technologists, the organizers, and the production workers themselves—for this, for this would be a gross injustice. The problems of our industry have been seen in the shops of the enterprise, just as in the entire sector. This plant (initially the name was "KIM," then MZMA—Moscow Economy Car Plant, and finally, the AZLK), which began with the assembly of trucks from the Gorkiy plant, was the first in the sector, just before the war, to turn out economy cars (the "KIM-10"). Older persons recall the compact "Moskviches," which had no trunks, scurrying about city streets; nowadays they cost less than a motorcycle. However, once in a while the little cars, which were much more reliable than the economy cars turned out much later by the Zaporozhye plant, can still be seen today.

The "Zhigulis" which began coming off the assembly lines of the automotive giant on the Volga in the early 1970's substantially affected the prestige of the "Moskvich" models at that time. The Tolyatti "Fiats" won the sympathy of car enthusiasts right away with the advanced technical features and shapes and their ease of handling. Of course, the motor vehicle owner has nothing to do with the reasons some plants move ahead and others are impeded. However, for the sake of fairness it is worth mentioning that if the AZLK had been like the VAZ [Volga Motor Vehicle Plant] at that time, with the party and Soviet leadership as its high patron, it would have received huge investments for renovation, the purchase of foreign equipment and technologies, and it probably would have spurred ahead in quantity and

quality, even under the conditions of the administrative-command system. But this did not happen. And it could not happen, since they redirected the monopoly of one plant to another enterprise. It was assumed that the VAZ would be able to quickly satisfy the "hunger" for personal automobiles as well as bring in sizable amounts of foreign exchange. However, even today barely 40 percent of the demand for passenger cars in the domestic market is being met by our motor vehicle plants.

We will not tire readers with a list of the AZLK's attempts to keep up with the rapidly changing "style" in the automobile market. Are serious changes possible in product quality under production conditions in which the entire structure, from the cutting of a bolt to the assembly line, not just some procedural operation, machine tool, or group of them, has become obsolete? And since 1976, both domestic and foreign customers (referring mainly to the CEMA countries) have been buying the new "Moskvich" models (2138, 2136, 2140, 2137) and their modifications, which had nothing fundamentally different to distinguish them from previous models, either in the engine or other assemblies and units. However, the supplier enterprises in our own sector and other sectors have made (and continue to make) a significant contribution to this level.

Several years ago, photographs of a sedan with a contemporary aerodynamic design appeared in journals and newspapers. A sizable volume can be made from articles written about the M-2141, the latest AZLK model, although we have been unable to obtain technical literature on it. It seems that they are in no rush to circulate it, either for specialists or automobile enthusiasts. But according to reports from those who have managed to become quite familiar with the "41," the designers succeeded in creating a car which is able to compete with the renowned foreign brands of Peugeot and Opel. For example, this is what A. Dudin, whose experience with automobiles began with the "Pobeda" in the 1950's, has to say: "I have been driving a '2141' for more than a year now, nearly every day throughout the year. The car's cross-country capability is remarkable. It holds on to the narrow edges between ruts well. The rear-wheel-drive 'Moskvich' would have rolled off into a rut long ago, but this one runs and runs." Listing a number of what in his view are minor and major incomplete items of a "tactical" nature, he concludes: "The vehicle is up-to-date, quite dynamic and stable, and has good economy. My car consumes 7.9 liters of fuel per 100 kilometers in the city and 7 liters on the highway."

So how does it turn out? A decent model can be turned out on obsolete equipment; we have only to make the effort. No enthusiasm will help here, of course. What will help are large capital investments and specialists of a high professional level, first of all. The AZLK brain center today is made up of a thousand designers, engineers, technicians, and specialists in other vocations who work in the Design and Experimental Developments Administration. It is completely within this collective's competence to develop the design for a model that is

competitive on the world market. But as A. Kulikov, one of the managers of the prospective developments group, notes, the specialists in Western automotive firms have no conception of the obstacles from this administration which they have to force their way through.

Renovation of the production lines has been difficult. Complete reconstruction, not a cosmetic operation, has been required for production of a front-wheel-drive model. It was begun in earnest only after the AZLK acquired partial, though not full, independence and began without the pointing finger of the former Ministry of the Automotive Industry to conduct its business, dispose of profits, make purchases, and arrange business contacts with foreign firms. And they followed a more efficient path, as indicated by practice: working with the help of intermediary partners, as they did at the VAZ at one time. So a system of machinery facilities for transport interspecialization was created. (and something unheard of in domestic machine building: they were interested in this in the West, and it was not some provincial firm, but the largest automotive giant in the world, General Motors.) And other joint developments are under way, including to make their own power plant to meet all the basic requirements for economy, power, the ecology, and reliability. In the meantime, the engine is the most vulnerable point in the new "Moskvich." It is a VAZ engine from the sixth model which was satisfactory to some extent for its time, but not today. Though some foreign partners are still contriving to pull it up to market requirements somehow. For example, the Finnish side of a Soviet-Finnish joint stock company to produce the "Konela" automobiles equipped the engine of the "Aleko" (the "Moskviches" for the foreign market are under this name) with turbosupercharging, which increased its power considerably. However, this is not a fundamental solution of the problem.

A theoretically new engine has been developed for the "Moskvich," and by the AZLK designers. It will probably be put on the production line next year, when the automated welding line for automobile assembly (annual productivity 160,000 vehicles) is put into operation. An experimental industrial batch is now being turned out. In the future it is planned to manufacture an entire family of "clean" engines for the "Moskvich," three versions of which will be gasoline engines. Some of the vehicles will be equipped with an economical engine made in Ufa. A diesel version is also planned. Generally speaking, customers can hope to purchase a "41" with its own engine, obviously, no earlier than 1992.

At the automobile show in Paris in the fall of 1988, many visitors lingered at one of the exhibits in the Soviet pavilion—the shiny, elegant "Aleko." None of the Western manufacturers and dealers had ever seen an automobile with such a name, either in full size or in the literature. Alas, this was an exhibit model, although it had all the specifications indicated in the prospectus. But in order to put this automobile on the production line, both the AZLK itself and the suppliers of components must put dozens of items into production, provide new

technologies, and rise to a different level of quality with respect to many items. A great deal is not within their power at present. But things are not standing still. Once again Western and Eastern partners are providing assistance. Cast wheels have been developed, a transparent roof hatch has been put into production, the fifth door can be equipped with moldings and spoilers, the sides can be fitted with rubber strips, and so forth. So the time is not far off (we will hope for this, for as Yu. Borodin, the AZLK chief engineer, said, there are precise calculations and periods of time to finish the vehicle) when our automobile enthusiasts will be able to obtain a "Moskvich" which they will not be embarrassed to drive on the streets of European capitals.

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### 1989 Highway Traffic Accidents Scored

904H0203A Moscow *RABOCHAYA TRIBUNA*  
in Russian 11 May 90 p 4

[Article by *RABOCHAYA TRIBUNA* special correspondent A. Fedorov: "Death on the White Stripe"]

[Text] Moscow—These are the sad statistics of the country's highway accidents in the past year: 58,460 killed and 346,484 injured. Can we avoid a continuation of the tragedy?

*The facts published recently by the GAI [State Motor Vehicle Inspection] Main Administration of the USSR Ministry of Internal Affairs show that we have broken one more sad record. Last year the number of people in an average European city were killed and injured in accidents and crashes on the country's highways. Compared with 1988, the number of deaths rose by more than 10,000 (roughly this number die each year in France). It is an emergency situation.*

The first reason is the insufficient skill and poor discipline of the drivers. They are responsible for nearly two-thirds of the highway-transportation accidents.

There is a disastrous shortage of driving schools in the country. A wait of up to a year and a half is sometimes required to enter certain ones. There are not enough training vehicles, instructors, and training simulators. The ministries and departments responsible for this are not even thinking about taking steps to correct the disastrous situation. The USSR Ministry of the Electrical Equipment Industry and Instrument Making has not begun to carry out the government's instructions to develop technical facilities for driving examinations, and the USSR State Committee for Public Education has not been able to implement the very necessary Decree on Training and Improving the Skills of Instructors and Experts at Driving Schools.

*The facts are alarming. Every two weeks as many persons are killed in crashes as were killed in last year's worst accident on the gas pipeline in Bashkiria.*

When a bus belonging to the "Tuvamelioratsiya" Association went off a cliff last August, 12 persons were killed

and 22 received serious injuries. When a commission began investigating the causes of the tragedy, it turned out that the vehicle was in poor repair, there were 1.5 times as many passengers as stipulated by the established norm, and the driver had not even been instructed before the unfamiliar route. It is easy to blame everything on the "switchman"—on the driver, in this case. But here is a fact: overwork is one of the basic causes of bus accidents. Every fifth accident involves drivers who have been "behind the wheel" for over eight hours. And in the RSFSR Ministry of Motor Transport system, the overtime work per driver is twice (!) the permissible level.

We have spoken a great deal about the "extremes" of the campaign against alcohol. And poorly considered, hasty decisions have not led to anything good here. The stir surrounding the artificial shortage of alcohol engendered more dangerous tendencies. In 1988, the number of DTP [highway transport accidents] caused by drunk drivers rose by seven percent, but last year this figure increased by 30 percent. The increase is even greater in a number of ministries: 33 percent in the USSR Ministry of Petroleum and Gas Industry, 46 percent in the USSR Ministry of Defense, and 63 percent in the USSR Ministry of Installation and Special Construction Work.

The medical examinations before and after trips at many motor transport enterprises have become really disgraceful. And there is this fact: in Ipatovskiy Rayon, Stavropol Kray, every fifth "client" of the local drug clinic is a driver.

*In the past year alone, we lost nearly four times as many persons as in the nine years of war in Afghanistan.*

It is certainly well known that the United States had about four million motor vehicles back in 1924. Last year we reached a "record" point in the number of vehicles manufactured. Here is the paradox: the number of accidents in our country is increasing out of proportion to the number of vehicles.

And an appeal to reduce the number of vehicles manufactured, which is small by world standards as it is, will not save us. There is a different reality here: the equipment being turned out by domestic industry has been lagging behind foreign equipment in active, passive, and post-accident safety for decades. We know about systems such as antilock brakes, onboard diagnostics, and a directional computer only by hearsay or on prospective models, which will not be "shining" for us in the near future.

Never mind the directional computer! Far from all the passenger buses are even equipped with safe windshields and steering mechanisms. Some 40 percent of the demand for spare parts for general-purpose transportation has not been met. The situation with "private" vehicles is no better. The VAZ [Volga Motor Vehicle Plant] cuts back on spare parts deliveries year after year. If they are represented in rubles per vehicle, the VAZ delivered parts valued at 42 rubles per year in the mid-1970's, 36 rubles per year by the early 1980's, and it

is delivering parts valued at only 26 rubles now. This is the reason a windshield for the "Nine" costs 1,000 on the "black market," and theft of wheels from a "Zhiguli" has become a common occurrence.

*Old vehicles, hence ones in poor condition, are speeding along the country's roads, and each one of them is a source of danger.*

In the RSFSR Ministry of Motor Transport alone, half of the taxis being operated and a third of the buses have completed normative periods of service, but there are not enough new ones. Because of defects which are a threat to traffic safety, the GAI has banned the operation of almost two million vehicles.

Russian roads are criticized and cursed in particular. The statistics show that there are about a million kilometers of general-purpose roads in the USSR. But only 20 percent of them are over seven and a half meters wide and are categorized as main highways. There are three times as many accidents on the country roads, detours, and other roads. And the newest highways and super-highways are already overloaded by several times as much today. For example, on the Moscow Circumferential Highway (MKAD) traffic is six times heavier than the traffic it was designed for. It does not have enough markings, lighting, and well-organized parking places. And there are five deaths and injuries for each kilometer of the MKAD!

*Tens or even hundreds of the persons involved in accidents could have been saved if help had come in time and if it had been skilled help.*

Many motorists were justifiably indignant over the increased taxes on individual motor transport. The money obtained should have been used to improve the roads. But changes for the better are not taking place, and the money has been stuck somewhere in the depths of the state budget. It is really terrible to travel on the roads today. Road repairs are often made in an unskilled manner; more simply stated, they pour hot asphalt on ice or puddles and patch up the holes.

Frequently the "first aid" vehicles which go to the accident sites are not provided with the necessary equipment or specialists and physicians. Only seven specialized trauma teams are operating in Moscow, with its many millions of people.

One more piece of evidence—up to 40 percent of the victims on country roads are taken to hospitals by a passing vehicle. This means it is unlikely anyone can give them skilled medical attention. No one has figured out how many of the nearly 59,000 persons could have been saved if members of the militia trained in administering first aid had come to the accident locations.

*The GAI inspectors, following the example of drivers, were formerly given the unflattering nickname of "punchers." The warning tickets have now been abolished, but quite a*

*few problems and shortcomings remain in the service which is responsible for order on the highways.*

A GAI inspector on a route is sometimes simply one who catches violations and collects fines, the system for which is far from perfect, by the way. During a recent check it was revealed that one-third of the trainees at one of the schools were unable to pass a test on the Traffic Rules. But these are the persons who have to monitor the others, you know!

And once again, the eternal stumbling block—technical equipment. The Moscow Administration of the GAI lacks hundreds of patrol cars, and those that it does have sometimes need to be written off, not repaired.

Little that is practical is being done to correct this tragic situation. The militia employees themselves are waiting impatiently for the USSR Highway Traffic Law to be approved by the Supreme Soviet, but a hearing on it has been deferred for an indefinite period. *The specialists' predictions do not inspire us with optimism: the conditions on the roads will not be improved in the near future.* Nevertheless, it seems to me that a good and thorough document will not be able to change the actual conditions, and good intentions are at risk of remaining on paper. The All-Union Interdepartmental Commission on Highway Traffic Safety, whose regular session was held on 17 April under the chairmanship of V. Bakatin, the minister of internal affairs, is hardly able to make a great change, either. Since the commission is not a directive organ, it cannot decide anything, except perhaps to conduct the next "rating." Is it possible that the dramatic nature of the situation will force us to give some thought to establishment of an effective legislative organ which would keep everything in hand, similar to the State Commission for Extraordinary Situations under the USSR Council of Ministers? Why not organize a commission on road safety in our government? Because of the dissociation of departments, their flagrant failure to carry out their responsibilities, and the organizational confusion and deplorable technical condition of all road services, we are once again at risk this year of having hundreds of thousands of our fellow citizens killed and injured in accidents.

UDC 380/.382:629.113.006.032

### **Motor Vehicle Product Certification Examined**

*904H0255A Moscow STANDARTY I KACHESTVO  
in Russian No 4, Apr 90 pp 11-13*

[Article by A. P. Gusarov and R. K. Fotin, candidates of technical sciences, Central Automotive Proving Ground, USSR Ministry of Automotive and Agricultural Machine Building: "Certifying the Product of Automotive Manufacturing"]

[Text] In entering the foreign market, the automotive industry was among the first machine building sectors to encounter the need for certification of its output.

It is well-known that automotive manufacturing had up to 80 percent of the total foreign currency receipts from the export of machine building output until recently. Inasmuch as it has been impossible to sell uncertified output in the Western market, and even in the CEMA countries lately, our plants have been familiar with the certification of automotive equipment for a long time.

Most of the potential importers of our motor vehicles in European countries participated in the Geneva Automotive Equipment Certification Agreement in 1958. Our automotive industry is guided basically by it for that reason, but the vehicles themselves are certified in well-known foreign centers, chiefly in France, Italy, and Czechoslovakia. Some of the output is certified in conformity with the importing countries' requirements (Canada, Sweden). Taking into account the relatively small number of domestic vehicles exported, compared with the leading automotive manufacturing powers, this practice has been entirely acceptable since it did not entail large expenditures.

Nevertheless, in 1987, the USSR became the 22d member country of the Geneva Automotive Equipment Certification Agreement within the framework of the United Nations' Economic Commission for Europe (ECE). This became necessary because of the increased expenses for certification in other countries and because we lacked the necessary testing facilities to come up to the international level.

The agreement stipulates the common requirements and methods for testing automotive equipment in the participating countries and mutual acceptance of the results of the tests conducted by the laboratories accredited and registered in the ECE. The requirements and testing methods, which are published as ECE specifications, are drafted by experts from the countries concerned and adopted on the basis of the consensus (general consent) principle. At present, 83 specifications are in effect and about 20 are being drafted.

The specifications system is very dynamic—about five new ones, as well as 10 to 20 amendments to existing ones, come out each year. The member countries are free to make a decision to accept one specification or another. They can apply national standards instead of any specifications or in addition to their requirements.

In conformity with the agreement, the USSR has registered official organs competent to certify automotive equipment in the ECE: an administrative organ responsible for issuing the license (certificate) and monitoring product adherence to this license and the technical services capable of conducting the official testing. The USSR Gosstandart [State Committee for Standards], as the national organ for certification, has delegated the functions of administrative organs to the ministries which turn out the products. These ministries have named the technical services, which have been accredited jointly by the ministries and the USSR Gosstandart.

In the Ministry of Automotive and Agricultural Machine Building system, the administrative organ is the sector's lead institute, the NAMI [Central Motor Vehicle and Automotive Engine Scientific Research Institute], and the technical services are the Central Automotive Proving Ground (for 43 specifications relating to passive and active safety, the ecology, and so forth) and the "Avtoelektronika" NPO [Scientific Production Association] (for 11 specifications relating to lighting and signal instrumentation). Administrative organs and technical services also have been established under the USSR Ministry of the Petroleum Refining and Petrochemical Industry (tires), the USSR Ministry of the Construction Materials Industry (safety glass), the "Ekstprom" Association in the Estonian SSR (safety belts), and the USSR Ministry of the Shipbuilding Industry (motorcyclists' helmets).

A well-equipped experimental facility for the technical services should be the basis for objective certification. At present this facility has been developed at the Central Automotive Proving Ground of the Ministry of Automotive and Agricultural Machine Building and the "Ekstprom" Association in the Estonian SSR. The other technical services have not equipped their facilities properly thus far and have not been accredited for this reason. And even the largest technical service at the Central Proving Ground is still not in a position to certify automotive equipment in accordance with roughly 15 to 20 specifications. The main reason is the lack of equipment which is not produced in the USSR and the socialist countries. The foreign exchange to obtain this equipment from other countries is not being provided, despite the high-level promises.

Certification of automotive equipment has been developed at a rapid pace over the past two years. Certification tests have been conducted on a number of vehicle models produced by the MAZ, KamAZ, ZIL, and KrAZ [Minsk, Kama, imeni Likhachev, and Kremenchug Automotive Plants]; motorcycles and mopeds made by the Tula, Minsk, and Riga plants; and trailer equipment made by the Odessa, Minsk, and Tiraspol plants. The fact that their cost has risen by five times as much compared with 1987 attests to the increased amount of work involved.

Plants which manufacture passenger cars are not in the list mentioned, since certification of them is being continued in the foreign centers. This does not concern us at present, since the foreign technical services will be able to replace the domestic services completely in the 1990-1991 period. Moreover, the value of foreign certification is that certification can be obtained not only in accordance with ECE specifications, but the directives of the Common Market as well.

As already pointed out, domestic vehicles' compliance to the ECE specifications has long been an obligatory condition for production at our plants. And the level of compliance for passenger cars is higher, but vehicles produced by the Volga and Zaporozhye Automotive

Plants and the Plant imeni Leninist Komsomol are in full compliance. There is no question that this has a positive effect on the technical level and increases the competitiveness of domestic vehicles.

The unsatisfactory equipment of technical services, the inadequate skill of the personnel, and a number of other problems which are being corrected too slowly are hampering more successful development of domestic certification. A number of the factors which influence the development of certification in machine building are examined below on the basis of experience in beginning domestic certification for automotive equipment. But first let us attempt to answer the question: what does certification involve, taking the USSR's participation in international agreements into account?

Unfortunately, certification is considered in isolation from the system of state product testing, and sometimes to counterbalance it, as a rule. But participation in international agreements is considered only for the purpose of certifying exported products.

We are proceeding from the assumption that a state testing system is essentially a national certification system, although it really needs to be improved. Unfortunately, the deficit economy and the practice of centralized financing of a number of production facilities are hampering full adoption of the very sensible certification system (for free market conditions) which is in use in other countries. But we should adapt our national system of state testing to it and we have this capability. In this connection, it needs to be particularly noted that by joining the Geneva agreement, the USSR made the commitment not only to export products in compliance with the provisions of this agreement, but to apply them in its own territory and to make its national standards conform to the ECE specifications as well.

In this connection, we believe that the acceptance testing which has been farmed out to the producer by the USSR Gosstandart should be returned to the status of state testing. In this first stage of state testing, we have to come to a conclusion beforehand on compliance with those requirements in accordance with which certification is to be conducted and authorization is to be given for experimental-series production and sale of the product within 1 to 1.5 years. The certification itself has to be conducted with experimental-production series models so that the production technology, as well as the construction, can be evaluated.

So qualification testing has to be replaced by certification testing in full compliance with provisions of the ECE specifications. Monitoring of the compliance of series production has to be continued by inspection tests. In this form, the system of state testing will be in full compliance with the standards of the Geneva agreement, differing only by the presence of the first stage of acceptance (precertification) tests, which can be eliminated smoothly later on when competition develops in the commodities market. All three stages of the testing

have to be conducted only at the accredited state testing centers or ones under their aegis, of course. In order to implement this concept, we have to restore the system of sectorial standards for test organization in the sector.

Determining the requirements for the output being certified is the next important factor in developing a domestic certification system. The agreement does not impose a pattern for application of the specifications, but it requires that the standards and methods of those specifications which the country has adhered to be fully utilized in the national standards. This approach has provided freedom of "creativity" for the different domestic organizations. Usually the specifications are simply copied and included in the state standards and other NTD [standardized technical documents]. And the "copiers" often enter corrections to these specifications (with the best intentions, of course). Later this standard is circulated for a response from the plants which require changes to bring it into conformity with their capabilities. As a result, either the standard differs substantially from the ECE specifications or it cannot be put into effect for a long time. This practice is particularly unacceptable if it is taken into account that nearly every specification acquires a minimum of one amendment per year. This may be illustrated by the following example. The drafts of standards for toxicity and air pollution of the ATS [expansion unknown] have not been moved for a year now, which deprives the plants of guideposts for the future. In addition, the drafts of standards for this year have become obsolete and lag behind the specifications concerned.

Direct application of the ECE specifications as the state standards are essential in order to radically change a provision. The fact that the ECE publishes its specifications in the Russian language makes this task easier. Implementation of our proposal, which corresponds to the practice of most European countries, incidentally, would automatically eliminate the traditional torment of our standards makers at all levels who have to make a determination, inasmuch as our standards correspond to the international standards. Unfortunately, this proposal cannot be resolved in the USSR Gosstandart for a long time.

By interpreting and solving the two problems described above, we can approach the solution of the third problem—development of a national certification system. This system is based on two integral parts: the international and national standards.

Compliance with international standards (the ECE, for example) is obligatory in all cases—in products delivered for the domestic market, and exported and imported products.

Compliance with national standards is obligatory for domestic and foreign equipment delivered for the domestic market. At the same time, it is necessary first of all to sort out those standards which affect safety and the ecology, as well as the most important standards from

the viewpoint of state interests (resource conservation, for example) and the consumer's interests (economy, for example), from the entire range of state (and restored sectorial) standards.

A separate certificate is issued for each ECE specification in accordance with established international practice.

When the issuance of national certification, together with certificates for individual specifications, it is advisable to issue a unified certificate which lists all the national and international standards in it which are appropriate for a given type of output, such as a means of transportation, for example.

The establishment of a common administrative organ is an important task for the near future. The decision adopted at one time to delegate the functions of administrative organs to the producing ministries, including subcontracting facilities, has not stood the test of time because of the lack of a common policy for certifying a motor vehicle, motorcycle, and so forth, as a single unit. So the problems of domestic certification of safety glass have not been resolved to date and tires have been certified by the USSR Ministry of the Petroleum Refining and Petrochemical Industry by violating provisions of the Geneva agreements. Nevertheless, autonomous administrative organs continue to be created (for example, authorization for this has already been given to the USSR Ministry of the Shipbuilding Industry). Our proposal is to organize a common administrative organ for automotive equipment and its components. Taking into account the difficulties which arise when attempts are made to establish a single organ under the USSR Gosstandart (the lack of specialists, facilities, supplies, and so forth), we propose that a single organ be established on the basis of the Central Motor Vehicle and Automotive Engine Scientific Research Institute.

Questions of financing the certification should be resolved unambiguously on a statewide scale. Experience shows that particular problems do not arise when there is initial certification financed by the manufacturer. You cannot say this about the financing of various kinds of activity by an administrative organ, including: a review of testing results and the issuance or cancelation of a previously issued certificate; checks on the effectiveness of a manufacturer's quality system, including inspection tests of series output; and relations with foreign certification services concerning information on certified domestic output, and so forth. The administrative organ should be absolutely independent from the customer. For this reason, taking foreign experience into account, its activity and the activity of technical services or other organizations and enterprises associated with product quality control on its behalf should be financed centrally by the state. We must proceed from the assumption that the state protects the interests of the consumer and its own interests through the administrative organ.



The financing of scientific developments in the process of shaping national and international requirements within the appropriate ECE specifications is an important problem. In our country, as a rule, the manufacturer itself finances and carries out developments such as these, which is absolutely incorrect. This is done throughout the world with state funds; only in this case does it have a right to count on the progressive nature of technical legislation. Thus 20 to 30 percent of the certification centers TNO (the Netherlands), EUTAC (France), and INTA (Spain) are financed by the state, and these funds are used to develop standards, long-term research, and so forth. The results of such research are utilized in developing ISO [International Standardization Organization] standards, the ECE specifications, and the ECE [sic] directives, as a result of which the countries' national interests are taken into account in the international legislation. This financing has been provided in our country thus far by the sectors. With the shift to cost accounting and the curtailment of centralized financing, the funds allocated for this work are being cut back first of all. For this reason, we believe that this work should be specifically financed by the USSR GKNT [State Committee for Science and Technology], Gosstandart, and Goskompriroda [State Committee for the Protection of Nature] (research in standardization of ecological requirements).

Determining the procedure for certifying a production facility for output is an important matter which should be resolved as quickly as possible. The point is that 45 ECE specifications apply to passenger cars at present, for example, and in accordance with the procedure advanced by the USSR Gosstandart, a followup on the 45 areas should be conducted by a commission, or more precisely, by commissions, and it is impossible to guarantee that what is being evaluated complies with the specifications.

Indeed, how can a commission evaluate the guaranteed capability of a production facility to turn out a vehicle with a passenger compartment that will retain space for the passengers to survive in a collision with a stationary object, for example? After all, this depends on the construction, the quality of materials, and the technology. At the same time, all the necessary requirements for the structure of the vehicle as a whole and its assemblies and each part are incorporated in the technical specifications and technical documentation.

Consequently, the commission for certification of a production facility should not analyze compliance with each specification, in our view, but assess the capability of a production facility to turn out a product in conformity with the TU [technical specifications] and the effectiveness of the quality control system in use. Moreover, we believe it is possible to simplify the procedure considerably by making plants responsible for providing guarantees that the industrial process is prepared to turn out a product in conformity with the technical specifications, signed by the technical director and the manager

of the OTK [technical control department] (state acceptance), leaving the right of followup inspection to the administrative organ. This practice is completely in compliance with the ECE specifications.

At present, domestic enterprises apply for certification to foreign centers, which do not require the organization of these commissions to certify a production facility with undetermined functions. The ZIL enterprise applies to Czechoslovakia and the KamAZ applies to Yugoslavia, for example. The technical services in Czechoslovakia and Yugoslavia are inferior to ours, but on the other hand, they do not make the demands mentioned on their plants. As a result, the enterprises are forced to make lengthy and expensive trips for certificates and the domestic certification centers are losing customers; the objectives set by the USSR Gosstandart are not being achieved.

Everything stated above applies to certification of domestic products. But we are not concerned about the lack of state quality control for products brought into the country. Any national system of certification should be aimed at protecting the domestic market and the interests of the public in a given country, not the market of other countries. Any model of vehicle or any model imported individually should receive official approval by competent organs for this. The availability of certificates in compliance with ECE certification may eliminate the need for testing, but not for application to these competent organs.

In the USSR, where the immense market is attracting the attention of many countries, the procedure for importing products has not been defined, and as a result, only a small proportion of the vehicles imported pass the necessary tests. But after all, cases of a negative finding (vehicles from Romania) or requirements for product completion (buses from Turkey) in accordance with test results at the Central Automotive Proving Ground of the Ministry of Automotive and Agricultural Machine Building are far from being a rarity. For this reason, it is necessary to quickly put domestic certification in order and to involve the GAI MVD [State Motor Vehicle Inspection Administration, Ministry of Internal Affairs], the USSR Gosstandart, the Customs Service, and the administrative organ for certification of automotive equipment, which has a card file on the equipment certified within the ECE framework and the opportunities to organize testing at a domestic base when necessary.

Resolution of the problems raised in the article should not be delayed; they will help to introduce a system for certifying automotive equipment in the country as quickly as possible.



**Improved Moskvich Announced**

904H0194A Moscow ZA RULEM in Russian No 4,  
Apr 90 pp 8-9

[Article by A. Sorokin, chief designer of AZLK [Moscow Motor Vehicle Works imeni Lenin Komsomol], under the rubric "Soviet Technology": "The Moskvich Has Been Modernized"]

[Text] The popularity of an automobile and its success for the consumer depend not only on the perfection of the initial design, but also largely on how quickly the manufacturer modernizes it, taking into account operating experience and the growing demands of the consumers. The improvements that are incorporated far from always affect the external appearance and may not be appreciated at first glance. The aggregate of them, however, has an appreciable effect on consumer features and operational parameters. The modernization of the front-wheel drive automobiles from Motor Vehicle Works imeni Leninist Komsomol, designated AZLK-2141-01 and AZLK-21412-01, could serve as an example.

The reduction in the weight of the car with the basic options should be noted first and foremost along with the standardization and optimization of the transmission gear ratio, thanks to which it was possible to improve the dynamic properties and fuel efficiency. The weight has been reduced by 15 kg [kilograms]. This was achieved via the use of a lightened maintenance-free battery and thinner glass in the side and rear windows (3.2 rather than 4.5 mm [millimeters]), as well as an in-line radiator for the cooling system with plastic tanks. Some body parts have been lightened (naturally without detriment to its strength, as was confirmed by the appropriate tests). The plastic fuel tank, with a capacity increased by 5.5 liters, makes it possible to lengthen the driving time between refuelings by roughly 80 kilometers.

The vibro-acoustic properties and, accordingly, the vehicle comfort have been improved via the incorporation of molded insulation and additional sheathing in the exhaust system cavity. The use of shielded spark plugs has reduced the level of radio interference.

The interior of the modernized cars uses new seat upholstery made of washable fabric with enhanced resistance to fading. Fabrics specially developed for these models have been manufactured from stronger and more wear-resistant thread that allows air to pass. The shape and features of the seat-cushion elements have been improved: the middle and side parts have different levels of firmness. This provides for more comfortable seating and improved support for the body under the effects of lateral forces. New plastic parts have been introduced into the interior, and the color spectrum has been broadened. We also note such details as the sling to lift the rear shelf when opening the hatchback and the plastic lining for the hatchback. The shape of the control instruments has been changed, and a trip odometer with reset

has been added. The outside mirrors have been modernized and have now been installed on the right side as well as the left.

We hope that purchasers will also approve of such innovations as the energy-absorbing steering column and metal-fluoroplastic support bearings for the front suspension struts, the installation of which was brought about by a reduction in forces on the steering wheel and an increase in the sensitivity of the steering mechanism. Experience has shown that additional brackets are required under the hood along with parts to protect assemblies and instruments. They are now also included in the standard accessories of the vehicles.

The plant specialists, considering reliability to be one of the basic operating parameters, have developed measures to increase the service life of the car to 200,000 km. The changes affected the design of the body, the power plant, the front-wheel drive, the clutch and chassis parts. Materials were replaced in a number of cases. Testing of cars with the aforementioned changes was performed from January to December 1989, as the result of which the planned service life of 200,000 km was confirmed.

The range of options installed for additional charges has been expanded. The base price of the AZLK-2141-01 and AZLK-21412-01 is 13,500 rubles.

*From the editors. There is no doubt of the usefulness of improvements in the design of the Moskvich. The lack of correspondence of their amount and the increase (38 percent!) in the retail price, however, is obvious even for our consumers, brought up on directive prices. The gross wantonness with the pricing even aroused the indignation of the workers of AZLK this time: the council of the labor collective of the assembly shop was "against wages going up through price increases" (PRAVDA, 9 Feb 90). And how can the actions of Goskomtsen [State Committee on Prices] and the plant executives be tied to the repeated assurances in the name of the government that there would be no unsubstantiated price increases in 1990?*

#### **Brief Description of the Technical Features of the AZLK-2141-01**

(data that differ for the AZLK-21412-01 are in parentheses)

**General data:** seats—5; weight in equipped form—1,055 (1,065) kg; top speed—158 (150) km/hr; time from 0 to 100 km/hr—14.9 (18) seconds; fuel consumption at 90 and 120 km/hr and in city driving—5.8 (6), 8 (8) and 9.9 (9.8) liters/100 km.

**Engine:** model—VAZ-2106-70 (UZAM—331.10); displacement—1,569 (1,478) cm<sup>3</sup>; compression ratio—8.5 (9.5); power—76 (72) hp/56 (53) kW at 5,400 (5,500) rpm.

**Transmission:** clutch—dry, single-disk; gearbox—five-step (1—3.308; 2—2.050; 3—1.367; 4—0.946; 5—0.732; reverse—3.357); final drive—3.9 (4.1 for the

AZLK-21412-01 and some of the output of the AZLK-2141-01).

**Features of the Modernized AZLK-2141-01 and AZLK-21412-01 Automobiles**

Feature	Standard/Optional
rear window wiper	optional
locking fuel cap	standard
rear trailer hitch	optional
increased-capacity plastic fuel tank	optional
mudflaps on all wheels	standard
enlarged hubcaps	optional
asbestos-free brake and clutch linings	optional
fuel-line jacket	standard
fog lights	optional
modernized mirrors	standard
metallic-fluoroplastic suspension struts	standard
shielded spark plugs	standard
in-line radiator with plastic tanks	standard
underside dirt-protection parts	standard
additional brackets for wiring and fuel lines	standard
service-free battery	standard
protection against unauthorized opening of hood	standard
headlight wipers	optional
additional sheathing for exhaust-system cavity	standard
thinner side and rear glass	standard
combination of instruments with trip odometer	standard
headlight adjuster	optional
energy-absorbing steering column	standard
controls with altered symbols and illumination	standard
seats with improved ergonomic properties for cushion elements and new upholstery	standard
molded insulation	standard
new colored-plastic parts	standard
flexible shelf sling	standard
plastic hatch liner	standard

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"Patriot", "Za rulem", 1990

**New LIAZ Bus Reviewed**

904H0194B Moscow ZA RULEM in Russian No 4, Apr 90 pp 9-10

[Article by LiAZ [Likino Bus Works] NTTs Chief Designer Yu. Andronov: "A Bus for the City"]

[Text] Almost every one of us has felt the drawbacks of public transit. And they are caused largely by the lack of a modern, comfortable and reliable high-capacity bus in series production. Now the 1967-model LiAZ-677 has

begun to give way to the new LiAZ-5256 on the assembly line of the Likino plant. But while only a few hundred of this model have been produced so far, they will displace the old ones entirely in three or four years.

The new model differs radically from the prior and well-known Icarus models in configuration. The V-shaped diesel is located behind the rear axle, in the rear overhang, as they say. The engine does not limit the level of the floor and is better accessible in this configuration, while the noise and vibration have less of an effect on the passengers and the driver. The automatic transmission frees the driver from shifting gears, repeated hundreds of times during a work shift, and aids in the quick and smooth acceleration of the heavy vehicle, providing good dynamics on streets crowded with transport. The driver's work is also eased by the power steering, efficient braking and good seating ergonomics. The driver's seat can be adjusted for height, distance from the wheel, angle of the spine and hardness of the springs.

No less attention was devoted to planning the passenger area, ease of entrance and exit and the efficiency of the lighting, heating and ventilation. The basic model of the bus for crowded city routes has 24 seating places and a maximum capacity of 120 people.

The dual-flap doors are of the rotating type with a reliable drive, good insulation and increased glass area. The handrails have been installed in asymmetrical fashion in the passageway of the middle door for the convenience of passengers with large luggage or baby carriages.

The ventilation system is a combined one. There are wide sliding vents in the side windows and three vent hatches in the roof, as well as four fans installed in it. Fresh air enters through a separate vent for the driver.

The passenger compartment is heated by four heaters connected to the engine cooling system; there are another two in the driver's compartment. Additional heating of the coolant with automatic control is envisaged in the event of very cold weather. It can be used for the pre-start warming of the engine or heating the passenger compartment if the engine is not running.

We assume that the readers, among whom are bus drivers, will also not be uninterested in other features of the vehicle with which the design engineers associate reliable, efficient and prolonged operation.

The body has a frame made of steel pipe of rectangular cross-section. Experimental prototypes were subjected to prolonged testing for resistance to torsion fluctuations and were tested with blows in collisions and tipping over. The body protected the vital areas in the cab and the passenger area reliably in all cases.

No little attention was devoted to corrosion resistance. The body covering was thus made of galvanized steel plate around the lower perimeter, and the hatch covers were made of aluminum alloy. The footboards, steps and

wheel wells will be manufactured of plastic. All of the shaped parts of the body are covered on the inside with an anti-corrosive coating, their joints and welds are protected with sealing gaskets and plastisols and the underside of the body has a bituminous coating.

The KamAZ 7408.10 diesel (special modification) has been installed in the bus. It runs quieter than the base model, as well as more economically, has increased torque and is less toxic.

The new vehicle envisages the essential active and passive safety measures. The bus is equipped with four autonomous braking systems. The working system is a pneumatic-drive one which has two separate circuits and drum-type brakes for all wheels. The parking-brake system has braking mechanisms for the rear axle and is driven from brake cylinders with spring-loaded power storage. It is controlled pneumatically. This system also performs the function of emergency brake. A hydromechanical decelerator installed in the gearbox serves as an auxiliary braking system. It is also controlled pneumatically, while the driver selects the braking mode using a lever.

The good view from the driver's position ensures safety. Electrically heated outside mirrors are envisaged.

The passengers may get out of the bus quickly when necessary through two emergency window exits and three ceiling hatches as well as the doors. The doors may be opened in an emergency both from inside and from outside using emergency-opening buttons. The engine compartment is lined with non-flammable material, and fire extinguishers are installed in the passenger and driver's compartments. The driver stops the engine using a special breaker on the instrument panel, shuts off the fuel feed, turns off the bus power and simultaneously turns on the emergency signals. The bus conforms entirely with the UN EEC safety requirements overall.

The assimilation of models for suburban routes (45 seats) and airports, as well as northern and tropical models, is planned for the future.

#### Technical Description of the LiAZ-5256 Bus

**General data:** wheel configuration—4 x 2; number of seats—24; maximum capacity—120 people; number of doors—3; weight in equipped state—9,600 kg [kilograms]; total weight—17,800 kg; top speed—70 km/hr; fuel capacity—240 liters; standard fuel consumption at 40 km/hr—no more than 21 liters/100 km. **Dimensions:** length—11,400 mm; width—2,500 mm; wheelbase—5,840 mm; distance from road surface to bottom step—360 mm, to floor level—740 mm; door width—1,200 mm; outside turn radius clearance—no more than 11.5 meters. **Engine:** model—KamAZ-7408.10; type—diesel, four-cycle; disposition of cylinders—V-shaped; engine displacement—10,850 cm<sup>3</sup>; power—195 hp/144 kW. **Transmission:** gearbox—hydromechanical automatic, three-step (1—2.43; 2—1.44; 3—0.98; reverse—1.97); with hydraulic decelerator and interlock hydraulic torque converter; rear axle—with planetary wheel reducers; overall gear ratio—5.44. **Suspension:** front and

back wheels—rigid-axle pneumatic. **Tires:** tubeless oval tires with steel cord, 11.00/70R 22.5.

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#### Motor Vehicle Binary Fuel Use Tested

904h0228 Moscow IZVESTIYA in Russian 23 Apr 90  
Morning Edition p 2

[Article by B. Urigashvili, IZVESTIYA correspondent, Tashkent: "Binary Fuel: Profitable But Troublesome"]

[Text] Georgian specialists have displayed initiative in placing in operation a new fuel system for automobiles. It has already been tested in actual practice and promises great economic and ecological results.

It was in the summer of 1987 that the first reports appeared in the press concerning the Leningrad inventor Yu. Karpenko. It was he who proposed the use of a benzo-gas mixture for automobiles in place of the conventional fuel. And now, several months later, five automobiles are in operation on Tbilisi streets using this binary fuel.

Their operation has revealed the high effectiveness of the system and as early as July 1988, in accordance with a decision handed down by an inter-departmental republic committee, a working group was created for conducting a detailed study of this question. It included specialists from the republic's Minavtotrans [Ministry of Motor Transport], the Scientific-Research Center for Safety of Movement of GAI [State Automobile Inspection] of MVD [Ministry of Internal Affairs], the Institute of Mechanics and the Georgian Polytechnical Institute. The components of the binary fuel—gasoline and compressed petroleum gas (propane-butane). A mixture of these elements will provide better fuel consumption and a fuel savings of from 35 to 45 percent under conditions of intensive municipal traffic. It will permit the use of inferior quality grades of gasoline. Tests carried out at an automobile testing ground revealed no deterioration in the operational and aerodynamic qualities of the re-equipped automobiles. Of equal importance is the ecological side of the problem—when idling (automobiles at intersections), vehicles operating on binary fuel release 10 times less carbon monoxide into the air than the amount permitted by the all-union standard. The content of nitric oxide and hydrocarbons in the exhaust gases is also lowered. The system is safe and costs only 300 rubles. It would appear that everything is in favor of its introduction.

It was proposed by a subunit of the Innovation Center of the Inter-Trans -Scientific-Production Cooperative "Novator" and the Scientific-Production Introductory Center "Danergva." Design, technological and operational documentation has been prepared, personnel have been trained and a special compartment has been equipped in one of the garages. Moreover, these re-equipped automobiles are already moving about the

streets in Tbilisi, Batumi, Yerevan and Yaroslavl. However, under the conditions imposed by general funding, the cooperation specialists are unable themselves to solve the problems concerned with organizing gas tank exchange points, introducing new gas refueling stations into operations or ensuring the availability of tanks and completion parts.

I was told at the "Novator" Cooperative that they are laying no claim to a monopoly. They are prepared to offer free assistance to all organizations and private individuals who are interested in this development. They expected assistance from the republic's Sovmin [Council of Ministers] and from society in the form of a "go-ahead" signal. But the problem is a state one and the advantage is obvious.

### Motor Vehicle Market Competitiveness Viewed

904H0178A Moscow *TEKHNICA—MOLODEZHI*  
in Russian No 3, Mar 90 pp 24-26

[Article by German Smirnov, an engineer: "How Motor Vehicle Works Delude Our Consumers"]

[Text] Several months ago, I. Aksenov, the first deputy general director of the Avtoeksport foreign trade association, when replying to questions from PRAVDA readers about the competitiveness of Soviet passenger cars in foreign markets, stated:

"Based on the ratings of our partners, the Samara-2108 is an automobile that is at the world level in its class based on its main parameters. However, an insufficient—in comparison with Western types—level of comfort, a worse layout of the interior and the quality of installed electronics reduce its merits. These individual 'minor details' spoil the picture. Our other factories have only begun to re-equip. Thus, it is still early to talk about the competitiveness of the new Moskvich or Zaporozhets—it is necessary for buyers to see them...."

Is this not really a cheerful picture? Everything necessary has seemingly already been done; it remains only to paint the body and trim the interior a little bit better and add radios and tape recorders—and the vehicles will begin to compete successfully with the best models from West German, Japanese and Italian firms. Unfortunately, this is not so. A paradoxical situation has now taken shape with respect to the sale of Soviet passenger cars. According to all estimates and ratings, they seemingly are not inferior to foreign types in any way; nevertheless, the latter are clearly preferred in foreign markets.

The suspicion arises against one's will that our methods for evaluating technical level and our parameters for comparison with foreign models suffer from serious shortcomings which do not guarantee the trustworthiness of the examination. Shall we try to examine where the trouble lies?

The principle of comparatively evaluating technical level, which only works when using a foreign analogue that is very similar to the domestic model, is at the base of the methods that we have accepted. Since the selection of this analogue depends on the worker, he is always tempted to take not the best but an average analogue—but not at all the poorest one—so that his model will appear a little bit better when compared with it. Furthermore, the parameters of the domestic model—their number now reaches 100—are divided into the appropriate parameters of the analogue and each of the obtained relative values is multiplied by the coefficient of that parameter's weight. An expert assigns the value of the coefficients themselves more or less arbitrarily; however, their total should be equal to 1. If 1 is obtained when adding the results of the multiplications, our model is considered equal to the analogue; if less than 1, the model is worse than the analogue; if more than 1—better.

Statistics show that the majority of our models are certified at a 1.0 level, that is, all of them are considered equal to the analogue and worthy of the Seal of Quality. Enterprises and collectives have received the bonuses stipulated for this and places of honor in the competition. However, it is not difficult to understand that, besides the urgent and highly qualified work of production collectives, the subjectivity and departmental interests of the experts, who establish the value of the weight coefficient and the principle for averaging the figures that are used in these arithmetical operations, can also influence the height of the ratings rather strongly.

Without mentioning the labor-intensiveness of the calculations, the rating result itself is an abstract number devoid of any physical meaning and one in which the vehicle's main parameters dissolve into the mass of subsidiary ones. In looking at all these complex parameters, it is impossible to understand what the automobile seemingly is: large or small, heavy or light, etc.

Engineer V. D. Burdakov has proposed a new method for rating transport equipment based on the T technical level criteria. The criteria for evaluating the operation of transport—"tran," which P. G. Kuznetsov and R. I. Obratsova suggested in 1980 be used in economic calculations (cf. my article "Numbers Which Have Transformed the World" in *TEKHNICA—MOLODEZHI*, No 1, 1981)—are at its basis.

In contrast to the widely used ton-kilometers, trans, which represent the product of ton-kilometers multiplied by the square of the delivery speed, reflect the essence of any transport process more objectively and reliably. Figuratively speaking, in the economics of transport, the tran plays the same role that effective work performs in engine theory. What would energy calculations be worth if not the production of energy expressed in kilowatts but the total revolutions of the turbine rotors were at their basis. Without considering the torque in the shafts, it is

clear that the calculation of the number of rotor revolutions can only give a distorted picture of the development of power. The introduction of the tran, which takes into consideration the speed in delivering freight, permits not only the absolute value of transport services to be calculated but also a system for the main indicator required to make the calculations to be developed.

Thus, in the T technical level criteria, the absolute transport work and the good quality of the transport equipment's design are correlated with the fuel expenditures for a transport operation. T is measured in trans per ton of fuel. Having processed a mass of data for 700 Soviet and foreign automobiles using a common method, V. D. Burdakov constructed a graph using the coordinates N (the motor's power expressed in horsepower)-T (in trans per ton of fuel). Its analysis has permitted one to establish that a world market field exists, if one can express it this way. It is composed of the aggregate of points: Each of them represents one or the other model whose place is determined based on the power of its engine and the T criteria calculated from the registration certificate data with the help of V. D. Burdakov's nomograms.

The upper and lower borders as the limits of the technical level clearly stand out on this field. The most competitive models from the different firms and countries are located within the area outlined by them. The higher the T criteria of this or that machine, the higher its technical level and its steadfastness in the competition. For a successful rivalry, it is necessary to develop automobiles for whom T is at the maximum—it is here that an uncompromising struggle for superiority in the technical level takes place. If a new model is below the minimum boundary, the world market will not accept it.

A comparison of the technical level of compact and subcompact classes of the same type with four of our new models that have been widely discussed on the pages of the central press: the VAZ [Volga Motor Vehicle Works]-1111 (Oka), ZAZ [Zaporozhye Motor Vehicle Works]-1102 (Tavriya), VAZ-2108 (Samara), and AZLK [Moscow Motor Vehicle Works imeni Lenin]-2141 (Moskvich), has been done using the graph.

Let us begin with the Samara-2108, which I. Aksenov has already mentioned. For the comparison, the West German Opel Kadett was taken as its analogue. Its technical level criteria ( $T = 7.64 \times 10^{14}$  tran/t) differs extremely negligibly from the maximum value of  $T = 7.82 \times 10^{14}$  tran/t. According to this data, it is not difficult to determine that the place, which the Opel Kadett occupies in the world market field, is determined by the relative value of the world level  $T_{\text{mir}} = T/T_{\text{maks}} = 7.64/7.82 = 99.7$  percent. The similar figure for the Samara is 33 percent; thus, our vehicle is almost threefold worse than its analogue. The ratio of the technical level of the new Moskvich model, the AZLK-2142, to the maximum value is 32.27 percent. This is 2.37-fold lower than that of its analogue—the Japanese Honda Accord model (76.25 percent). Things are a little bit better with

the Oka—the VAZ-1111. Indeed, based on the Tmir it even exceeds by several percentage points its analogue—the Japanese Suzuki Alto; however, the analogue itself does not occupy a sufficiently high place in the world market among automobiles of its class. Its technical level is only 40.5 percent of the maximum.

Of all the new Soviet models, the Tavriya (the ZAZ-1102), whose technical level is  $4.13 \times 10^{14}$  tran/t, has the best indices. It is extremely close to its Italian analogue, the Fiat Uno Fiyer, which is only 4.6 percent inferior. However, both of them are almost twofold worse than the West German Volkswagen Golf model which comes close to the maximum technical level for machines in this class:  $7.4 \times 10^{14}$  tran/t.... This is the situation of our promising new models; concerning the Zaporozhets, Moskvich and Zhiguli models, which have been developed by our industry and which are now being produced, all of them are either below the minimum world level or barely exceed it. Therefore, one cannot talk about their serious competition in the world marketplace.

For the sake of fairness it is necessary to mention that the new models are a step forward in raising the level of Soviet motor vehicle products. The T criteria permits this growth to be evaluated quantitatively. Thus, during the period from 1960 to 1985, the technical level of the six ZAZ models steadily increased from  $0.662 \times 10^{14}$  to  $1.032 \times 10^{14}$  trans/t; that of the eight AZLK models—from  $0.627 \times 10^{14}$  to  $1.54 \times 10^{14}$ ; that of the eight VAZ models—from  $1.209 \times 10^{14}$  to  $1.37 \times 10^{14}$ . This means that ZAZ increased the technical level of its products 1.8-fold during the 25 years; AZLK—2.46-fold; and VAZ—1.67-fold.

Despite this increase, the quality of all the earlier models remained low. Only two models of the Moskvich—412 IE and 2140—and three models of the Zhiguli—2104, 2105 and 2107—exceeded the lower boundary of the world level. Concerning the Zaporozhets, not a single one of its models reached the minimum boundary of the world market. The new generation of Soviet compact cars—the AZLK-2141, VAZ-1111 and VAZ-2108—have decisively crossed the minimum boundary; however, all still continue to be in the lower part of the world market field. Their technical level is approximately equal and does not exceed the limits  $2.63 \times 10^{14}$  -  $2.73 \times 10^{14}$  tran/t. The success of the Zaporozhye Motor Vehicle Works, which has been able to design a model with the greatest reserve of competitiveness in our motor vehicle industry is more gratifying: its technical level is 1.5-fold higher. Thus, there is progress for the better; true, it is still insufficient for today's requirements, especially along the line of manufacturing quality, technical servicing and firm service.

A question arises: Why does the technical level, which is defined in accordance with our present methods as being equivalent to the level of the analogue, fall flat and turn out to be unexpectedly low when calculated using the T criteria?

An engineering analysis has shown that the presently existing methods overlook in the examination several important aspects of consumer qualities, which consumers are primarily interested in when buying automobiles. The future automobile owner always prefers a model which has a larger carrying capacity, operating range, speed and low operating expenses, that is, the one whose obtained useful effect is the maximum one with minimum expenditures to achieve it.

How does the traditional method respond to these requirements?

Let us take carrying capacity. The design load on one seat is 68, 70, 80, 84, and 92.5 kilograms in Soviet passenger cars. In foreign ones, it is usually not lower than 80 kilograms (Italy and Japan—80 kilograms; England—91 kilograms; France—95 kilograms; Sweden—106 kilograms; and the FRG—96-112 kilograms). This considerably reduces the total carrying capacity of our models as an indicator of transport equipment in general. Moreover, it is a peculiar loop-hole which permits adding it into the complete weight, which the analogue possesses, by reducing the useful load. As a result, the commercial efficiency of the full weight of our vehicles is 0.16 - 0.425 and for foreign ones—0.32 - 0.56, that is, 30 - 50 percent greater.

Another quality—the operating range based on the fuel supply—describes the independence of travel without intervening refuelings. It depends on two items: the size of the gas tank and the consumption of fuel. According to both of these indicators, Soviet passenger cars are inferior to foreign ones. The size of the fuel tanks in our models are 20 percent smaller on the average than those in their analogues and engine economy is 9-11 percent lower. (The fact that foreign vehicles require a higher quality fuel pushes the results of the comparisons even further together.) As a result, we obtain the following: With a full load, our vehicles have a range (450-800 kilometers) which is only 65-80 percent of the range of foreign analogues (500-1,125 kilometers). That is why automobile drivers must refuel their vehicle on long trips frequently and the number of gasoline pumps must be increased.

The next indicator is maximum speed. One would think that this question is not such an acute one. You see, high speeds are impossible with intensive traffic on the roads. However, let us look at this from another side. What does the fact that a foreign analogue having a 75-horsepower engine develops a maximum speed of 175 kilometers per hour and our model with a larger 78-horsepower engine and a less useful load weight provides only 155 kilometers per hour mean? This can only be explained by poor quality: an imperfection in the drive configuration, lower quality of materials and production techniques, etc. For each unit of power, the Samara-2108 is 1.06-fold inferior in maximum speed to its analogue—and this when it is five percent lighter in total weight, has a 19 percent lower useful load and is equipped with a more powerful engine! It is clear that

our model is extremely wasteful in comparison with its analogue; however, they are recognized as equal in accordance with the existing method!

An evaluation using the T criteria shows rather convincingly: No guile nor trick will lead to success while the products of our motor vehicle industry have not been brought to the requirements of the modern world market where their final fate is determined. The new method also suggests ways to increase the quality and efficiency of motor vehicles and permits a number of steps to be taken to eliminate the mentioned shortcomings. In order to reach the level of their analogues, it is necessary to bring the design load per seat to 100 kilograms for all classes of passenger cars; introduce standard sizes for fuel tanks in multiples of 40, 60 and 80 liters based on the vehicle class; introduce strict norms for raising the efficiency of engines by incorporating electronic ignition and the processing of fuel using electric and magnetic fields; etc.

In order to guarantee a steady increase in the technical level of our machines and in their competitiveness in the world market, it is necessary to establish state norms for the mandatory superiority using the T criteria: when designing a new model—1.5-1.65-fold; and when modernizing an old model—1.2-1.45-fold. During certification: for the state Seal of Quality, T should be no lower than 0.7 of the world market's maximum technical level; for the highest category of quality—0.4-0.7 of it; for the first category of quality—equal to the world market's minimum level.

From the Editors. We are confident that this topical subject—although one which has been painful for a long time—which the author of this article addresses, will leave neither the consumer—the motor-car enthusiast—nor the producer—the motor-car designer and builder—indifferent. One can roughly surmise the reproaches and conclusions that both sides advance. However, to surmise—that is one thing; a lively and frequently unpredicted discussion by people who are equally disturbed by the quality of the passenger cars being produced in our country—is another matter. Therefore, we invite those who wish to a discussion which, we hope, will only serve to benefit all of us.

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### Computer Technology Aids RSFSR Highway Work

904H0224A Moscow AVTOMOBILNYYE DOROGI  
in Russian No 5, May 90 pp 1-3

[Article by A. A. Nadezhko, RSFSR deputy minister of highways: "Introducing Computer Technology in RSFSR Highway Work"]

[Text] Automated systems for management, design, and industrial production have been developed and introduced in the RSFSR Ministry of Highways for nearly 20 years. The types of computers and the developers and

users have changed over this period. Considerable funds have been spent to acquire computers and develop the software, which unfortunately have not produced the desired result, and they could not for objective reasons, as demonstrated by an analysis of the work that has been done.

In adopting the policy of developing standard systems and programs as the basis, the Ministry of Highways was unable to organize the distribution and introduction of computer hardware (VT) because the deliveries were extremely insignificant. As a result, the expenditures incurred did not produce the gain expected in a number of cases. Developments were introduced on a small scale or not at all. The policy of developing automated systems with a powerful host computer operating on the basis of data received on communications channels from organizations within their jurisdiction did not prove itself because of unreliable communications. The organizations having computers incurred large expenses for their operation and maintenance, which led to a rise in the cost of operations.

In 1980, the first section of the OASU-Doroga [Sectorial Automated Control System for Highways] was put into industrial operation in four areas: "Current record-keeping and control of economic-production activity," "Normative reference support," "Bookkeeping, accounting, and analysis of economic-production activity," and "Technical preparation for highway work." It cost a total of two million rubles to develop. With the introduction of the first section, information is obtained faster, its reliability has been improved, and the manual labor in processing it has been reduced.

Later on, new tasks were developed in these areas and in the areas "Highway operations," "Material and technical supply," and so forth. From 30 to 40 percent of the tasks that were developed are being used at present; the others are not in use because of changes in the economic mechanism.

In the 11th Five-Year Plan, the information retrieval system IPS-Most [Bridges] was put into operation; 15 different programs were developed for it and a database was created for 30,000 bridge crossings. The annual economic efficiency in using the system amounts to more than 50,000 rubles, with 15,000 rubles per year to develop and maintain it.

Scientific research conducted from 1981 to 1985 to develop technical facilities and methodical and normative documents, as well as software for the automated system for technical certification of highways (ASTPAD) made it possible to complete basic work on the subsystems: "Route," "Durability," "Condition," "Traffic," and so forth. From 1985 to 1987, they were put into experimental operation, making it possible to develop technical instructions for highway certification based on the use of traveling laboratories and an automated data bank on the roads. The IPS-Doroga information

retrieval system and an applied program package to analyze transportation conditions in the highway system are now being developed.

The first phase of SAPR-AD [Computer aided design for highways] was developed in 1981 by the Soyuzdorproyekt, Soyuzdornii and Giprodornii [State Planning Institute for the Surveying and Planning of Highways, State All-Union Scientific Research Institute of Roads and Highways, State Highway Planning and Surveying and Scientific Research Institute] and the second phase was developed in 1985. More than 250 programs were developed for computers of the YeS and SM types, making it possible to fully automate engineering and cost estimate calculations, as well as the layout of individual designs. More than 60 different programs were developed for the DVK type of PEVM [personal computer].

The level of design work automated in the Giprodornii, which amounted to 16.7 percent in 1985, reached 21 percent in 1989. Labor productivity in design for the 11th Five-Year Plan rose by 20 percent, and the annual economic gain from reducing the estimated cost of the projects planned averaged four to five million rubles. Numerous planning offices and planning and cost estimate bureaus are introducing computer aided design, leasing computer time in branches of the Giprodornii and other organizations which have the YeS and SM computers.

The proportion of design work automated in the PK and PSB [planning offices and planning and cost estimate bureaus] increased to 12 percent in 1989. Planning subunits in the Sverdlovskavtodor, Vladimiravtodor and Gorkavtodor [Sverdlovsk, Vladimir, and Gorkiy Highway Administrations] are having the most success in introducing automation. The planning office of the Mordovavtodor [Mordovian ASSR] introduced the ARM-1.01.03 unit, based on the SM 1420, in 1989. Development of software for the YeS and SM computers aimed at improving existing programs and connecting them up in a unified overall system is being continued at present.

In 1989, the Giprodornii and its branch developed an applied program package for processing materials from geological prospecting, software for determining elements in a route plan in renovating highways (with graphics), programs for designing the vertical alignment of road surfaces (with graphics), software for graphics representation of land drainage and reclamation, and a new version of the program for designing pipe.

The Remdormash Production Association developed an automated system for monitoring production and material and technical supply (ASKP) which was introduced in the 10th and 11th Five-Year Plans in the Volgodonsk, Smolensk, and Mamontovka plants and provides automation of the day-to-day management of production and its material and technical support. An automated information processing system (ASOI) was also introduced in the 11th Five-Year Plan. In 1987 a new trend began—the



development and introduction of standard computer aided design systems for highway engineering.

Six types of computers were being used as of 1 January 1990 in the ministry's organizations and enterprises: the YeS series (5 units), the SM series (10 units), the DVK (118 units), the YeS-1841 (10 units), the Nairi (4 units), and the Avtograf-840 (3 units). There are 164 DVK's in tekhnikums.

The situation changed abruptly in 1989 with the appearance on the market of foreign-made personal computers. More than 100 IBM PC personal computers were obtained, chiefly through joint ventures and cooperatives, in 1989. The sector's organizations and enterprises spent over 6 million rubles for this. Now a market has taken shape for personal computers, including personal computers with laser printers and minicomputers of similar capacity which are suitable for very complicated and high-volume operations. The appearance of high-quality personal computers has brought out the shortcomings of domestic computers—public health organs' restriction of the length of time for work at a display and their unreliable operation, as well as the few capabilities and poor design.

Familiarization with the practice of computerization using personal computers in the developed countries has demonstrated the shortcomings in our work. Even in the Giprodornii, which is one of the country's leaders in its level of automation among related institutions, has no computer aided design systems which enable it to carry out the entire cycle of design operations on the computer.

The existing SAPR-AD basically provides automation of the calculations, but not the processes, of design. When it was developed, it did not provide for automation of the most frequently repeated tasks. The most labor-intensive graphics and other types of work which do not require designers' high skill were not automated. There is no interactive mode, the user is isolated from the computer, and the systems are not compatible, which makes it impossible to combine its components into a unified circuit. The programs are poorly adapted and the algorithms require processing when there is a change in the normative base, which does not provide the opportunity to expand the task. Comparison of the level of design automation in the Giprodornii with foreign countries shows it is lagging no less than 15 years behind in this area.

Matters are even worse in other areas of activity: in management, industry, scientific research, and personnel training. The situation is aggravated by the fact that there are an increasing number of personal computers in the sector with different configurations and operating systems which are obtained with funds and purchased from joint ventures and cooperatives. At the same time, by acquiring computers at retail and concluding contracts for the development of programs, ministry organizations incur higher expenses. And

although the ministry has sent everyone recommendations on the features of the computers purchased, this spontaneous process is continuing.

Ministry organizations often purchase programs without being acquainted with them in many cases and without having information on the availability of sectorial programs. On a sectorwide scale, all these expenses are comparable to the expenses to obtain the computers. The purchase of a computer, but not the systems (that is, the combination of programs and hardware) leads to protraction of the period for introduction, freezing of the return on investments, loss of employee interest, and ultimately, lost profit.

Under these conditions, the ministry has worked out a program for introducing computer facilities in the 1990-1992 period aimed at implementing a unified technical policy on computer use, eliminating unproductive expenses, and coordinating actions by the numerous highway organizations. The program is intended for three years, but not for the five-year plan, because changes take place too rapidly and there is no opportunity to foresee the course of computerization. It is better to work out a new program every two or three years than to coordinate a five-year program every year.

The program's task is to develop and introduce complexes for high-priority tasks, based on up-to-date computer hardware, to achieve the maximum gain in the area of highway management in a short period of time at the ministry and the highway administration (motor road, highway construction trust) level and in designing roads and bridges in the Giprodornii, planning offices and planning and cost estimate bureaus, in scientific research, in industrial production by plants of the Remdormash Production Association, and in personnel training and skill improvement. The ministry's central staff, the Giprodornii, Rosdornii [RSFSR Scientific Research Institute for Planning Roads and Highways], Remdormash, highway administrations, motor roads, highway construction trusts, IPK [Skill Improvement Institutes], tekhnikums, and VTs [computer centers] are participants in the program. Participation by highway administrations and motor roads is determined in accordance with their wishes.

The following lead organizations have been assigned to perform the program tasks:

- the ministry computer center, for management at the level of the ministry and highway administrations;
- the Giprodornii, for automation of the design of motor roads and bridges;
- the Rosremdormekhanizatsiya NPO [Scientific Production Association], for automation of the management of the ministry's industrial enterprises and designing machinery; and
- the Rosdornii Scientific Production Association, for automation of scientific research.



In conformity with the program, the lead organizations are to develop software through their own efforts or with the involvement of specialized organizations, as well as obtain completed programs from outside organizations. The lead organizations are forming a consolidated resource of algorithms and programs through this. This work is being paid for from centralized funds. The Ministry of Highways is the owner of the programs held by the lead organizations. Organizations and enterprises of the ministry pay only for the cost of program circulation and maintenance. These funds and the funds from the sale of programs to outside organizations go partly to the centralized fund and partly to the lead organizations' fund to compensate for the expenses to develop the programs.

The program specifies the base organizations where the programs were to be introduced and accepted for experimental and industrial use. They are the Mosavtodor [Moscow Highway Administration], the Volga Motor Road, and Highway Construction Trust No 2. Under the program the Dorstroykomplekt Trust makes a centralized purchase of computer hardware (with its own working capital), in accordance with the lead organizations' recommendations, in large batches from joint ventures and cooperatives and subsequently sells them to ministry organizations in a set with the available software. Training has also been provided for employees of organizations in the sector who do not have special training in the computer field; special instruction is being organized by the lead organizations in the Skill Improvement Institute and in central training courses.

The program provides for common technical equipment of ministry organizations:

- for the ministry central staff, the YeS-1046 and IBM PC; for branches of the Giprodornii and the design subunits of highway administrations, the SM-1420 and SM-1700 computers and the IBC [sic] PC;
- for industrial enterprises of the Remdormash and the Rosremdormekhanizatsiya Scientific Production Association, the IBM PC personal computer, the YeS-1841, and similar computers;
- for the staff of highway administrations and other road organizations, the IBM PC personal computer; and
- for the production-technology centers of the Rosdornii Scientific Production Association, the DVK-4.

Equipment of the YeS and SM type which is available will be used until its service life expires.

The lead and base organizations are provided with computer hardware partly with centralized funds.

It is planned to develop software on the IBM for an organization (enterprise) in the form of multipurpose units of high-priority tasks, ready for use and with a minimum of adjustment locally.

The tasks for day-to-day management of production and highway administrations (motor roads and highway construction trusts) will be coordinated with the tasks being carried out at the ministry level. The list of these tasks specified by the program is based on suggestions from road organizations, taking the software that is available into account.

Among the computer aided design tasks for highways are automation of the design of the layout and profile, the roadbed, curves, road surfaces and pipes, and soil distribution; the SAPR tasks for bridges include hydraulic calculations, assignment of bridge spans, calculations for piers, and drafting of the piers and frameworks. It is planned to develop or acquire a system for cost estimates.

The industrial-production tasks include automation of road machinery design, development of a local information-computer network for an industrial enterprise, and planning and record-keeping, bookkeeping, and personnel tasks.

The tasks for scientific research and technology include mathematical modeling simulating actual physical processes, planning of a scientific experiment, and applied research programs for roads, bridges, and road materials.

For the quickest possible use of personal computers with the maximum workload, the hardware with the software available at the time will be sent to those organizations whose employees who have had a brief period of training in this equipment, using the programs mentioned.

For organizations, enterprises, and the ministry central staff, it is planned to obtain about 500 computers (mainly the IBM XT, AT and P-2) in the 1990-1992 period for the sum of 32 million rubles (in 1989 prices) and to spend 4 million rubles for software development. Taking into account the possibility of a decrease in the price of the hardware, the total expenditures may drop to 18 to 20 million rubles.

The estimated economic gain from implementation of the program as a whole, calculated by methods in effect for the corresponding areas of automation, is 62 million rubles. It is assumed that the expenses for 1990-1992 will be recovered during the period that the program is implemented. The actual amount of the gain will be determined in accordance with the results of the introduction.

Work to implement the program has begun. For tasks involving management at the ministry level performed on a personal computer, programs have been developed to calculate the requirements and distribution by highway administrations of machinery, metal, cement, lumber, and other materials and for keeping records of deductions, finances, and other tasks.

The Computer Center is working on the development of high-priority programs for the Mosavtodor and Highway Construction Trust No 2.

The Giprodornii has studied experience in design with personal computers acquired abroad, it has developed a basic concept of SAPR for the personal computer, it has developed and acquired over 20 programs for the personal computer, some of which have been put into industrial use, and programmers have been trained in special courses.

In order to speed up implementation of the program's tasks, specialists from higher educational institutions, specialized organizations, and centers have to be enlisted in developing the programs, and temporary creative collectives should be established when necessary to work on individual tasks.

At the same time that work is under way on the program, we have to look into the feasibility and advisability of uniting personal computers into a local area network, creating a network of YeS and SM computers and personal computers, and using electronic mail on these networks. This includes the task of linking the management system of the RSFSR Ministry of Highways with the system for the RSFSR Gosplan, the RSFSR Gosstab, and other republic organs.

We are interested in seeing that the practice and studies available in the highway organizations of union republics, the Soyuzdorproyekt, and the Soyuzdornii are utilized in implementing the program. Coordination of this work could be assumed by the Computer Hardware and Automated Control Systems (VT and ASU) Section on Highway Matters of the TsP VNTS [Central Board of the All-Union Scientific and Technical Society] of motor transport and highway employees.

We want to guard against the illusion that the problems of automation will be easily resolved, even with the availability of a sufficient number of comparatively inexpensive personal computers. First of all, the overall outlines of the program should be filled with specific content and documents regulating all the work. With all the importance of the measures planned, they will not produce a gain by themselves. Persistent work, initiative, and quick reaction to a changing situation are needed.

A great deal depends not only on the lead and base organizations, but on highway organizations and enterprises, who should set up a qualitatively new organization for acquiring and processing information and bringing it to users, train employees whose work requires the use of a personal computer in short courses, and organize an effective system for consultation and assistance for these employees. Young people must be brought into computer work. The transition to new methods will require time, effort, reinterpretation of management and design processes, and higher engineering skill. It is easier for young persons to do this.

Only continuous, purposeful work will lead us to success, and computerization of the sector will produce the gain which is potentially built into it.

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## RAIL SYSTEMS

### Train Communications Problems Scored

904H0215A Moscow GUDOK in Russian 30 May 90  
p 2

[Article by R. Andreyev, senior inspector in Tula, followed by commentary by the GUDOK Economics, Science and Technology Department; D. Nadezhin, engineer in the Radio Communications Department of the Signals, Communications, and Computer Technology Main Administration, Ministry of Railways; B. Yurevich, lead power engineer in the Passenger Main Administration; and G. Sivankayev, chief of the Technical Department of the Locomotives Main Administration: "No One Is Responsible for the Enunciation"]

[Text] The first volume of the novel "Doctor Zhivago" begins with the chapter "The Five O'Clock Express." It deals in particular with the tragedy of a passenger on the express train from Syzran—Yuriy Zhivago's father, who put an end to his life by jumping from a railcar when it was under way. The engineer's assistant had to climb a telegraph pole to contact the nearest station of Kologrivovka. Author B. Pasternak related these events to the year 1903. Nearly 90 years have gone by since then. Electric locomotives and diesel locomotives and automatic blocking and signaling have come to the railroads. But as far as train communications with "the land" are concerned, few changes have been made here.

Even the members of a crew of a small craft, no matter the latitude and conditions in which they find themselves, never feel separated from the outside world nowadays thanks to the radio. But a passenger train, sometimes carrying a thousand persons, traveling on tracks laid through regions that have been inhabited for ages, does not have such an opportunity. True, the engineer has a radio at his disposal, but the brigades servicing a consist have been deprived of the opportunity of transmitting or receiving any information. This not only reduces the quality of passenger service, but has a negative effect on traffic safety and at times puts the health and lives of people at risk.

Dozens of urgent matters may arise when the train is under way. Many persons have had occasion to hear an announcement such as this on the train radio's loudspeaker: "Comrade passengers! Emergency first aid is needed. If there is a physician among you, we ask him to come to car No..." That is fine if there is a doctor on the train. But if there isn't? An express train runs for four or five hours over some sections without a single stop. And all this time no one is in a position to help a sick person.

But here is the station, finally. Red hand flags show up on the car platforms—the conductors are signaling that the train must be delayed. One of them rushes to look for the first aid room. The sick person will not survive without attention, of course. But the train? It has already been knocked off schedule by standing for an extra 10 to

15 minutes. If there had been communication, arrangements could have been made with the station's first aid room beforehand, and physicians could already be waiting on the station platform for the train's arrival.

I have had occasion to discuss this subject more than once with the brigades servicing passenger trains. Their unanimous opinion is that it is essential to have communications when the train is under way. In particular, this is what the chiefs of train No 35 from Moscow to Tskhaltubo and train No 27 from Moscow to Kislovodsk say: "Our trains are used chiefly by those going to health resorts, persons suffering from some illness. Sometimes they require emergency medical assistance, but we cannot provide it with the best will in the world."

Sometimes there are other kinds of situations: the militia must be called out to quiet down a rowdy person or even apprehend a criminal. And sometimes to correct a technical malfunction which threatens harm. But there is no radio communication and there is nowhere to get help.

Or even take a case such as this: a train has stopped on an open line and stands for an hour or two. The passengers besiege the train chief to find out what has happened. But alas, he just shrugs his shoulders, since he himself does not know the reason for the stop or when the consist will start moving. The people become more agitated, and someone risks being late for work, for a transfer, for a business meeting... There are enough reasons for concern as it is!

I know that the problem of communication with the outside world has been resolved technically. A radio station should be set up in the staff railcar for communication with the engineer as well as the nearest stations. But certain railcar sections are only creating the outward appearance that this work is being carried out. It will soon be a year that an RV-2 radio station was installed in the staff car of train No 96 from Zaporozhye to Moscow. However, in the words of train chief S. Ushkats, it has never been used since there is no equipment in the locomotives to communicate with this radio station. So why does the brigade need expensive window dressing?

There is also another facet to the problem being examined. Passengers in the staff car of a company express from Moscow to Batumi "besieged" the train chief. They had obtained tickets after considerable difficulty, but the consist had departed half-empty. The chief says that he had provided information on the seats available in time, and there is a signed telegram. He said he does not know why the tickets were not sold.

It turned out afterward that tickets on this train had been registered to a group of tourists from Kishinev, but their train arrived in the capital from Moldavia so late that the group did not manage to get to the Kursk terminal on time. As a result, two cars were empty when they left Moscow. But they were mentioned as occupied by employees of the Seating Records and Distribution Bureau. Under the current system of ticket sales for the "Ekspress-2" train to the Caucasus and Crimea, these

cars can travel empty until they reach Kursk itself, that is, to the border of the capital's mainline.

It should be explained that information on empty seats could have been provided promptly to the next station if the train chief had communications available while en route, and tickets could have been sold, of course.

In conclusion, I recall the circumstances of the wreck at the Kamenskaya station which upset the country two years ago. A freight train picked up speed when its brakes failed to work and it ran into a passenger train standing at the station. The freight train's engineer warned the train dispatcher of the impending danger. The dispatcher immediately informed the engineer of the passenger train by radio. The only way out was to pass through the Kamenskaya station without stopping and to pick up speed in order to minimize the force of the collision if it could not be avoided. But the conductor on one of the cars which carried several persons who were to get off at the Kamenskaya station pulled the emergency brake. The catastrophe became unavoidable.

But if there had been communication between the locomotive brigade and the staff car, the wreck might not have taken place!

#### Commentary by the Economics, Science and Technology Department

There are quite a few problems "of long standing" in transport. R. Andreyev touched upon one of them. Many times our correspondents and GUDOK readers have spoken out on this problem, but nothing has been done. Almost 20 years ago, in 1972 to be precise, one of the articles led to a review of the situation that had developed by the MPS [Ministry of Railways] leadership. Under the headline "Communications from a Passenger Train Are a Civic Right," the newspaper published an account of the results of the discussion, which stated in particular:

"The Scientific and Technical Council, the Signals and Communications Main Administration, and the Railcars Main Administration are ordered to review in 1 month the question of developing equipment for radio communication between the brigade leader (chief) of a passenger train and the seat assignment and use groups in the divisions."

The authors of the document probably did not say "review," rather than resolve the question, to no purpose. Just as they did not single out only one direction out of the entire complex, even if it is an important one, to no purpose. Although the same report stressed that a radio is needed in the staff car and in order to be able to communicate with the station dispatcher in emergency situations.

It cannot be said that nothing at all has been done since that time. However, a problem which is not very complicated technically has not been resolved to date, in fact. It is doubtful that there are several dozen passenger

trains in the system whose brigade leaders will be able to call the engineer. Because another decade and a half and the tragedy at the Kamenskaya station were needed to put an end to the bureaucratic delays and get down to business.

We asked specialists from the three main administrations concerned—signals, communications, and computer technology, passenger, and locomotives—to tell us what the situation is now.

[Nadezhin] "It is common knowledge that the locomotive is the strongest source of interference in train radio communications, including shortwave (KV), just one channel of which has been set aside for the railroads. And since all radio stations are using one frequency, even within the limits of a small station the traffic, track, and signals workers and all the others hear each other and nothing can be understood. For this reason, the 'Transport' system, which has more than 130 channels on VHF (UKV) is being used more and more extensively. Every user is assigned his own channel here, and the audibility is much better because of this. An average of 50 percent of the users in the system already have VHF, and 90 percent of the Moscow Railroad's users have it, for example."

All the technical problems were resolved a long time ago with three types of radio stations—fixed (RS), mobile (RV), and portable (RN). The first ones are installed 150 to 200 kilometers before a station, the train chief and locomotives have the second ones, and assistant stationmasters, LVK [possibly: locomotive and railcar complex] dispatchers, the militia, first aid rooms, and so forth have the third ones. When a consist passes 10 to 15 kilometers away from an RS, the train chief can communicate with any of the station workers listed above.

As far as communication between the train chief and the engineer is concerned, only 1.5 to 2 meters of cable has to be installed between the first car and the locomotive if a radio is available. Our signals and communications subdivisions are under contract with depots to perform this work. But here and there the depot workers themselves are setting up and installing the radio stations.

[Yurevich] "Everything turns on the availability of radio stations. Back in 1987 a plan was approved by order of the Ministry of Railways to provide RV-2 radios for the train chief to communicate with the engineer. It was planned to equip 87 cars in 1987, 100 cars in 1988, 600 cars in 1989, and 720 cars in 1990 with these radios. However, the radios essentially began arriving from the 'Orion' Radio Plant in Ternopol only last year. According to information as of 1 May, the Ministry of Railways had received 580 radios. They are being set up right away, of course, but it is hard to say how many are already in operation. Especially as we do not know how many VHF radios are on the locomotives."

[Sivankayev] "Practically all passenger locomotives have been equipped with VHF radio stations. The Passenger Main Administration is lagging behind, so that is their

concern. And there are still a great many problems in this area, generally speaking. The engineer's radio is always set in the receive-transmit mode for communication with the dispatcher, and he has no time to talk with the train chief for that reason. Traffic safety is first of all!"

Further. The RV-1 (locomotive) radio stations turned out by the "Orion" Radio Plant in Ternopol are not operating consistently, although they are very expensive—7,000 rubles. Signals workers have now begun to modernize them. True, we have long used the series radios turned out by the Novosibirsk Radio Plant (ZhR), but before the Kamenskaya tragedy depot workers usually left their VHF units in storerooms because of their uselessness. When they learned of this, the plant workers stopped delivering them altogether. Now they have had to make arrangements to resume production. So it is a difficult situation.

It remains to be added that not one of the persons we have talked with has made bold to respond to the specific question: how many passenger consists now have communications between the train chief and the engineer? A survey has to be conducted on the railroads for this, they explained to me. And it has become completely obvious that with the current approach to the matter in every main administration, more than 1 year will pass before the problem is taken off the agenda. As Arkadiy Raykin used to say in the splendid lines about false teeth: one person pulls out the teeth, another one takes the measurements, and a third one makes the bridge, but no one is responsible for the enunciation.

#### **Railway Minister Interviewed on Tasks Ahead**

904H0185A Moscow PRAVITELSTVENNYY  
VESTNIK in Russian No 14, Apr 90 p 8

[Interview with Minister of Railways N. Konarev by V. Belyayev: "A Great Deal Still Remains to be Reviewed"]

[Text]

[Belyayev] Nikolay Semenovich, in your interview four months ago you invited PRAVITELSTVENNYY VESTNIK readers to express their opinions on railroad transport's work. You also promised to tell us how collectives are getting through the winter. Your invitation has been accepted by our readers. As you know, the editorial board has received dozens of letters containing questions as well as suggestions. Certain writers are taking issue with you...

[Konarev] First of all, I cannot help but thank PRAVITELSTVENNYY VESTNIK readers for the active involvement which they have demonstrated and the sensible ideas they have expressed. Without exaggerating, I must say that these letters have helped us to evaluate our work more critically and to take note of those snags, as they say, which have become familiar to us as transport workers. And enough of them have accumulated to spare, as they say. I will also say that I instructed managers of the ministry's administrations

and railroads and enterprises in the sector to make each of the responses to that December interview the subject of special attention in their daily practical work.

[Belyayev] A number of readers have expressed concern about railroad employees' work last winter. It is common knowledge that this is the time of year that promises nothing good for transport workers or consequently, for the national economy.

[Konarev] Yes, the freezing weather, the snowdrifts... And we have had them. For example, in the Transbaykal, Siberia, and Vorkuta. Do you recall when we met I was talking on the selector with Donetsk, where unexpected snows had nearly disrupted the normal pace of operations on the mainline? But on the whole, fortunately, the winter was "mild," as they say, and weather conditions did not have a particular effect on our work. But then, something else complicated the situation a great deal.

[Belyayev] You are referring to the strikes in certain areas, and the events in Abkhazia, Moldavia, and the Transcaucasus?..

[Konarev] Exactly. As a whole, we did not carry about 50 million tons of freight last year for these reasons. The sector's total losses for 1989 added up to a half billion rubles, according to our calculations. But this is according to the Ministry of Railways. Roughly 800 million rubles of physical assets were excluded from national economic turnover every day as the result of such disorders!

And the current year did not begin easily. From 12 January to 20 February, traffic between the Azerbaijan SSR, the Nakhichevan ASSR and the Armenian SSR was practically paralyzed. We managed to restore it and put it in order with considerable difficulty, though it was again interrupted on 24 March as the result of an act of sabotage on a section of the Azerbaijan Railroad passing through the territory of the Armenian SSR.

In the last interview, I believe I stated that even a minor traffic jam on some section of the railroad system has a detrimental effect on rail transport operations throughout the country. This thought has to be reiterated and supplemented with the affirmation that attempts to solve political matters by methods of "rail war" cannot lead to anything good. They will have an instant effect on the work of all transport employees as well as on responses to the needs of the very persons who are organizing such antistate actions.

[Belyayev] Judging from everything, railroad workers were unable to carry out the tasks set for them last year...

[Konarev] Yes, that is so. But 1989 was the only year in the current five-year plan which we ended with a negative balance. On the whole, the planned outlines for 4 years of the five-year plan have been exceeded. For example, the labor productivity of workers engaged in freight transport rose by 19.6 percent, while the target for

this period was 9.4 percent; this made it possible to ship more than 113 million tons of national economic freight above the plan. The volume of passenger turnover exceeded the plan by nearly 5 percent. In 1989 alone, with the critical shortage of railroad passenger cars which I mentioned in the last interview, we carried 4.3 billion persons, not including those who used the metro.

[Belyayev] Meanwhile, many letter writers, such as Vyacheslav Danilovich Zakupra from Ryazan Oblast, Comrade Raskovalov from Sverdlovsk and Comrade Miminashvili from Tbilisi, are not pleased with the quality or organization of passenger service or with ticket sales. The editorial staff is not receiving any less such complaints. The impression is created that the Ministry of Railways, which is aware of the problem, is disregarding it anyway.

[Konarev] This is a very critical problem. And resolving it... How should I put it? Well, it is about the same as stepping on broken glass in your bare feet... The problem has now extended beyond the limits of the sector and has become national in scope. In any case, participants in a joint session of the Transport, Communications, and Information Science Commission, the Industry Commission, the Energy Commission, and the Science and Technology Commission of the USSR Supreme Soviet's Council of the Union held in February 1990 came to this conclusion and a discussion was devoted especially to this matter. As such a conclusion was drawn, it must be stated that all union republics and the ispolkoms of local soviets can and should take part in improving passenger transportation.

This does not mean that the Ministry of Railways is remaining on the sidelines, of course. As an example, negotiations with foreign firms are now under way for the joint production of double-deck cars at our car repair plants. We estimate that 2,500 of these rolling stock units, which are unusual for us, will appear on the mainlines as a result. And it is planned to modernize the passenger cars in operation as well to extend their service life.

[Belyayev] Won't this lead to the point that prices for rail tickets will fly up to the altitudes of airline tickets?

[Konarev] I repeat what I said four months ago: passenger rates need to be put in order. Incidentally, a number of those who wrote to PRAVITELSTVENNIY VESTNIK, such as Vadim Timofeyevich Kulichenko from Moscow Oblast, and reader Sidorov, who sent a letter from a rayon with three Moscow terminals, judging from the postmark, but for some reason did not give his name and return address, reproach me for acting against my conscience by saying that suburban trips are less expensive per kilometer than municipal public transport.

The fact is that we counted in a different way. The cost of one-time suburban rail tickets is quite high, but more than 60 percent of the passengers on suburban trains are making use of the reduced monthly and quarterly tickets.

And in this case the cost of a trip is six to 12 times less, amounting to just 1.3 kopecks to travel 10 kilometers.

[Belyayev] The last time we spoke about the railroad workers' social needs. Just a short time has elapsed, of course, but perhaps something has changed for the better here?

[Konarev] There have been improvements. The reaction of railroad workers reading PRAVITELSTVENNYY VESTNIK to the newspaper's article was unequivocal: the Ministry of Railways should do more to improve transport workers' social and living conditions. Analysis of the letters received became a good incentive to improve work in this direction. In order to increase the commissioning of housing, to provide railroad workers with certain additional benefits, and to improve their supply of foodstuffs and essential commodities, the Ministry of Railways has allocated 330 million rubles from its reserves. In addition, the USSR Council of Ministers, the USSR Gosplan, the USSR Ministry of Finance, and the AUCCTU, being aware of the importance of the matter, which is directly linked with traffic safety on the mainlines, as we mentioned the last time, have provided us with 850 million rubles to cope with the problems of top priority. All the same, I cannot help but say that further improvement in railroad workers' social and living conditions depends primarily on an increase in the volume and quality of transportation—this is the first and principal source of income in rail transport.

We came to the conclusion that unless we take the opinions of line personnel into account more completely, we will not succeed in managing the work as required. For this reason, we are now inviting them to meetings of the ministry's collegium more and more frequently. What has this produced?

This, as an example. As a result of a most serious discussion in the collegium, measures were worked out and are now being implemented which should lead to a sharp reduction in the number of women employed in hard manual labor in transport. Subsidiary farms are being established; this followed an analysis of railroad workers' complaints about the unsatisfactory supply of food products. Literally a day or two ago, the collegium reviewed an entire range of questions dealing with the working and living conditions of the railroad employees who work in the region of the Chernobyl disaster.

[Belyayev] You stated that both the union republics and local soviets should be concerned about improving passenger service. Here is a question in this connection: how do you view the work of railroad transport under the conditions of greater independence for the republics and their shift to regional cost accounting?

[Konarev] We are guided by the well-known decision by V. I. Lenin: "All federative, oblast, and other local Soviet organizations have no right to interfere in transportation work in view of the fact that, although the railroads pass through certain territory, they are by their very essence

extraterritorial, for they serve the needs of the entire republic." So the principle of the railroads' extraterritoriality and the inadmissibility of interference in their activity—under any pretext whatsoever—has been and continues to be basic for us. Railroad workers have been charged with the responsibility for fully meeting the requirements of the public and the national economy for high-quality transportation in a timely manner. Naturally, this requirement will remain completely in effect even after the introduction of planned market relationships.

On the other hand, we hope that the shift by republics, oblasts and krais to cost accounting and the shaping of their own budgets will enable them to take a more active part in resolving the problems of improving passenger service and developing a base for rail transport in the interests of local enterprises. Local organs can provide various tax advantages for railroad transport enterprises to stimulate their development and improve the quality of work.

Cooperation with local organs under cost accounting conditions is being extended considerably for our mutual interest. All questions require careful study and examination.

As an example, take the suggestion from Andrey Ivanovich Bolonkin from Leningrad and certain other readers. They say the railroads should be given the right to sell freight that has been transported when consignees are to blame for car layovers beyond any permissible limits. The Ministry of Railways has already come out in support of this, by the way. If it is implemented, of course, it would bring order to the station tracks. But the decision has not been adopted yet, although I do not think the local soviets would oppose such a step.

In a word, a great deal still remains to be examined. We will be working intensively on this in the near future.

[Belyayev] An untraditional question: what kind of relations does the Ministry of Railways have with the press?

[Konarev] I would say constructive relations, although I would like a more competent regard for our questions from certain writers. The spirit of an article in one of the mass journals recently came down to the point that the problems in transportation were caused not only by the lack of rolling stock, but the poor condition of stations. True, but only partly. It is a complex problem. We cannot say now that if we have enough cars we will put everything in order. Just as everything cannot be reduced to the development of stations, and so forth. It is a very thick tangle.

This is apparent even in the unloading of the cars. The press, including PRAVITELSTVENNYY VESTNIK, quickly began discussion of this problem at the start of the year and put it in the center of the public's attention. And the situation was improved as a result. As an example, 14 million tons of grain have been transported from the ports this year alone. We could have taken out

even more, but we did not always have the number of cars needed at our disposal, and the weather often created problems for the seamen.

It is common knowledge that in January, the USSR Council of Ministers' Decree No 30 provided for a five-fold increase in fines for an excessive layover or tardy delivery of rolling stock. It was stipulated that the entire increase in the fine goes to the state budget.

[Belyayev] Certain press organs have assessed this government measure as just a transfer of money from one state pocket to another...

[Konarev] An erroneous point of view. But it has appeared in newspapers, and as a result, some readers, such as P. I. Khodorchenko from Novorossiysk, believe that the government decree will serve only to enrich the Ministry of Railways. The period that the decree is in force is running out now, but although we have not been enriched, it would be good to extend it. After all, positive changes for the better have been noted, and we are now on the threshold of spring field work, when shipments of equipment, fuel, and fertilizers for agriculture are being increased. And the harvest will depend to a considerable degree on how the transport network functions in the coming weeks. But we continue to be concerned about unloading—especially on days off and at night...

In conclusion, I want to express hope for further constructive dialogue with the readers of PRAVITEL-STVENNYY VESTNIK.

### **Rail Ministry Organizational Structuring Pondered**

904H0189A Moscow GUDOK in Russian 20 Apr 90 p 2

[Article by A. Vaygel, chief of the Organizational Structures Improvement Department, Ministry of Railways: "Reorganization Is Not an End in Itself"]

[Text] The structure of transport management has been discussed by many generations of railroad workers. There was no unanimity 50 or 60 years ago, and there is none now, either. The suggestions being made are directly opposed to each other.

However, in advancing the suggestions for a fundamental change in structure, there are few who take the trouble to analyze the consequences of reorganization. Won't this make transport's basic job—meeting the needs of the public and the national economy for transportation—more difficult? How will social problems be resolved? And the main point—there is no specific mechanism in the suggestions which would make it possible to eliminate the shortcomings in the existing structure and to compel each railroad transport employee to think of the end result—the volume of freight and the number of passengers transported—as the source of his well-being.

Historically, the territorial-sectorial principle of management has taken shape in transport because of its multi-sectorial nature. On the one hand, in accordance with the line which determines planning and financial activity: the ministry - the railroad - the divisions - the line subunits. On the other hand, subordination of a sectorial nature, which provides basically for the solution of operational and technical problems: the main administration - the service in a railroad administration - the division department - the line subunit.

The duality in the subordination of the stations, depots, subdivisions, and other units is the basic reason for dissatisfaction with the structure in the local collectives. For this reason, most of the suggestions from line subunits do not carefully consider the essence of the problem when they demand that the railroad divisions be eliminated without knowing their functions, rights, and responsibilities. They consider them the root of all the problems.

It is hard to agree with this. Yes, the railroad divisions require adherence to discipline in carrying out the transportation process and in resolving problems, which do not always coincide with the interests of a specific collective. They establish a mechanism for economic relations which does not suit everyone, centralize part of the economic incentive funds which are formed in the interest of all collectives in the division, and so forth.

In a word, the division is the primary unit in which the product of railroad transport—transportation service—is created, and the stations, depots, and subdivisions—the shops which perform specific operations—are part of it.

So are these collectives justified in demanding that they be granted full rights as an enterprise in conformity with the Law on the State Enterprise (Association)? No one, for example, is suggesting that a mine or a metallurgical combine be divided into separate enterprises, although there are many independent services there as well.

In the sectors cited, the only reason the thought of such fragmentation does not enter their heads is that the end product the customer pays for is coal and metal. All the services in these enterprises operate under the conditions of internal cost accounting.

But for us, the territorial dissociation of line subunits creates the outward appearance of their independence. In addition, only the indicators of stations, terminals, and to some extent car depots are oriented toward transport volume. Once the activity of locomotive depots depended on the work per ton-kilometer as well. However, under pressure from group interests, the economists agreed to the indicator "locomotive-hours" for them; this is more suitable for calculating the wages of locomotive brigades than for evaluating an enterprise's activity. I doubt that the incomes of transport, and in the final analysis, the depots themselves, will be increased with the shift to the new indicator.



Many persons are under the delusion that collectives' economic status can be improved after eliminating the divisions and shifting to management on the basis of cost accounting. If someone manages to achieve something of this sort, it is only at the cost of others.

The inclination toward a sectorial structure is strongly supported by the services which have practically no interest today in the end results of the work of a railroad or division. A service is responsible only for the technical condition of the administration in charge: the better it is, the greater capacity reserve it has, the more peaceful it is.

But neither the main administration, nor the service, nor their line subunit are concerned that considerable capital investments are required for this and that this leads to increased operating expenditures. As a result, a parasitic attitude flourishes and an intensive search is conducted for arguments to prove who is more important—a traffic service worker, a locomotive engineer, a railcar worker, or a lines worker, and they seek to increase the funds for their own administrations through redistribution.

But since rail transport is a unified organism, we cannot allow disruptions in the work of any subunit, even the smallest one, because it will immediately lead to losses not only within its division and its railroad, but in the entire rail system and the national economy. The events of the past year in the Baltic, Moldavia, Georgia, and Azerbaijan are graphic evidence of this.

True cost accounting is impossible in railroad transport for this same reason. Its provisions serve only as an instrument for evaluating a rather complex task, how to correctly distribute the incomes from transport service among the enterprises which require proportionate development.

Logically, a sense of fellowship and an inclination toward mutual assistance and support should predominate in transport, not a division by sectors as frequently suggested. On the other hand, the inclination by collectives to depend only on the results of their own labor is understandable. Each collective's overall objectives will coincide as well when all workers responsibly and conscientiously carry out their obligations at their own work position.

Dissociation and deviation from the territorial principle will lead to the point that all problems of housing, living conditions, and supply for railroad workers and problems of material and technical support have to be resolved at the level of the railroad or even the ministry. This is impractical today, since an important role in solving such problems belongs to the local soviets.

In the event of a shift to regional cost accounting, the situation will be aggravated even further. Every local organ of authority will not agree to conduct its work with numerous railroad transport enterprises within a kray or oblast. It is impossible to visualize how problems would be resolved through the railroad administrations without

the divisions in Vorkuta and Murmansk if it is 1,500 kilometers to the first one and 2,000 kilometers to the second one.

The availability of a unified organ of management is especially important in local areas in emergency situations. It is objectively simpler and more efficient for organs of authority to collaborate and resolve problems in their own region with a railroad division. However, we need to ensure that such collaboration is beneficial not only to them, but to all railroad transport enterprises. This is also the responsibility and obligation of division managers.

At the same time, coordination of the territorial principle with an administrative and economic division is one of the reasons that it is not always possible to consolidate certain divisions, although the solution suggested would be expedient in accordance with the work procedure. Under the procedure in effect, enterprises and associations are established or abolished in coordination with local organs. Consent cannot be obtained to abolish a division. With rare exception, such a solution is not supported by railroad managers, either, that is, by the persons who bear responsibility for the end results of the work of vast collectives.

They realize that if there is excessive consolidation or complete abolition of divisions on a major railroad with the existing means of management, the tense situation in the national economy, and the critical shortage of certain types of railcars, an uncontrollable process can develop in transport activity.

Our current structure has taken shape over decades. In 1918 the hierarchy was as follows: the ministry, the okrug, the okrug line department, the section, and the stations. With the emergence of railroads in 1923, the line departments were renamed operating service divisions.

In 1930 the operating region was formed. In 1934 it was reorganized once again into the operating service division. Along with this, intermediate sectorial organs—the traffic and locomotive divisions—were organized, and in 1936, the passenger service divisions, which were subordinate to the appropriate services.

This structure continued until 1945, when 11 railroad okrugs were formed. In 1946, "to rule out parallelism in management" by the line subunits of the traffic, locomotive, and passenger service divisions, the appropriate departments were reorganized and included as part of the railroad divisions. However, all management of the production and economic activity of depots and subdivisions continued to be performed directly by the services.

The structure of railroad transport management was very cumbersome in those years: 11 okrugs, 56 railroads, and 274 divisions. There were 7,000 persons employed in the ministry's central organization and the overall length of the railroads was 115,000 kilometers.



So much of what is being suggested today has already been tried. The arrangement chosen for railroad transport in the USSR, with the vast distances and numerous enterprises involved, was the structure that was developed by 1958 and which still exists; it corresponds to the current administrative-economic division and the actual economic mechanism.

It is completely natural that it may be changed with the development of these dependencies. When the country's economic situation is improved and the shortages are eliminated, the influence of and dependence on local organs of authority will decrease and the conditions will be established for drastic consolidation of the divisions and railroads.

I hope that the political approach to the structure of management in the sector will disappear as well; it has led to the point where the Moldavian, Moscow, Azerbaijan, and October Railroads are now. The indicators of their work stand out over and over again. These are not large railroads, but they have the highest operating expenses and the worst record in making use of rolling stock and the basic production funds. There is a great deal of dependence on neighboring railroads in their operations, which is especially important under cost accounting conditions.

Unfortunately, the tendency to pull transport apart in accordance with "nationality" is becoming intensified. This is motivated by the improvement of transport management in the republics. But we have already had a sad experience in this area. And the result would be just the opposite if we proceed in this way. In the interest of the entire national economy, we should prevent such decentralization by all means. We do not have the right to forget the decision made by V. I. Lenin in 1918, at the worst point in the revolution: "No federative, oblast, or other local soviet organizations have the right to interfere in the work of transport, since the railroads are essentially extraterritorial, even though they operate in a specific territory, for they serve the needs of the entire republic."

The technological approach to formation of the structure would make it possible to reduce the number of railroads to about 20 and the number of divisions to 115 to 120 and to provide for reliable manageability of the transportation process. Consolidation of the divisions, in our opinion, is possible even today within a single oblast or kray. In this case, there can be a reduction of more than 30 railroad divisions. And mainlines such as the Azerbaijan, Donetsk, Kemerovo, and Krasnoyarsk Railroads would shift to a management structure without divisions. Later on they could be reorganized into divisions and included as part of the major railroads.

In conclusion, I would like to dwell on this. Reorganization is not an end in itself, but a means of achieving better results. This is always a more expensive and

complicated step which affects the fate of many people. For this reason, the approach to any breakup should be careful and considered.

The ministry is prepared to discuss any constructive suggestion aimed at improving transport management. But anyone who undertakes to criticize the existing structure should provide an answer to at least a few specific questions on the structure of the ministry or an enterprise:

1. What are the drawbacks of the existing system of management or the economic mechanism?
2. What changes need to be introduced in the management mechanism to compel it to operate in the new way?
3. How should the management structure be changed in this respect?
4. Give an assessment of the expected result of reorganization, taking the expenditures to carry it out into consideration.

Reliable management is the basis of railroad transport's steady operation. We should always remember this in approaching any reorganization.

#### City Information on Diskettes May Aid Railroaders

904H0205A Moscow GUDOK in Russian 16 May 90  
p 3

[Article by K. Vitalyev: "The City...On a Diskette"]

[Text] Rostov-on-Don—What should a deputy know about a city? Everything! It is important to always have information at hand and to obtain it instantly when necessary. A problem such as this is resolved simply in our time—with the help of personal computers. Diskettes—which store electronic memory—now have such vast capability that all the information which deputies need can be recorded on one of them.

Rostov residents have begun to develop a data bank on their city. Here are just a few of the subsystems which are being developed: "Population," "Production Infrastructure," "Housing," and "Ecology."

This information structure is now being developed by a group of scientists at Rostov VUZes and the university for their city. Requests for similar programs have come in from the city soviets of other cities—Kalinin, Smolensk, Kishinev, Ordzhonikidze, Odessa, and Sukhumi.

It sometimes happens this way—one idea pulls another one after it. But if such an interactive data system is so versatile, what can it provide that is useful, as an example, for a railroad or even the entire system? Possessing information and making use of it easily and quickly is to be master of a situation.

Personal computers and their programs are good because they provide the opportunity not only to obtain information, but to see it from the most varied viewpoints, in its dynamics and a section for any space and time.

Thus far there have been arguments: the stores are empty, no matter what you want, there are gaps, but here they are putting up computers. However, the residents of Rostov are not only putting them up, they are demonstrating that a computer will help to bring order to our home.

It was not for nothing that small reference books were in style at the start of the century—"All Moscow in your pocket." There was also one in Rostov—"All Rostov..."

### **Railroad Economic Programs Examined**

904H0205B Moscow GUDOK in Russian 16 May 90  
p 2

[Article by Professor A. Abramov, doctor of economic sciences: "Transport on the Eve of Changes"]

[Text] Moscow—The policy adopted to shift to a regulated market economy will result in important changes in the economic activity of railroad transport. I will share some thoughts on this problem.

Mainline rail transport has been considered as state All-Union property. This makes it possible to hope that it will enjoy the appropriate financial support. We do not have occasion at present to expect that the Ministry of Railways will acquire the right to set free prices (tariffs) for transport.

The introduction of standards for the largest possible list of types of transport should precede new tariffs. We have to review the normative periods for delivery of freight and norms for its natural loss. We have to introduce standards for passenger trains of various categories. It is enough for state price setting organs to confirm the average level of tariffs for shipments which correspond to these standards, in my opinion. It should provide for recovery of current expenses, the payment of taxes and other fees to the budget, it should meet the social needs of railroad workers, and it should provide in part for the development of transport's material and technical base, mainly on the existing lines.

Based on the average level of tariffs approved, the Ministry of Railways has to be given the right to establish carrying charges for specific types of freight and passengers. Transportation of higher quality (compared with the established standards) should be authorized for a fee in accordance with contract rates. It is legitimate to set up different duties for additional operations on a contractual basis.

New rail lines for common state and strategic use should be built with capital investments allocated from the budget. It is also legitimate to compensate transport for the current expenses to maintain and amortize fixed

capital associated with the availability of throughput capacity reserves, for the amortization of imported rolling stock when the need for it cannot be met by deliveries from domestic industry, and for the transportation of passengers making use of preferential travel.

Recognizing the indisputability of keeping most railroad property as part of All-Union ownership, the construction of new railroad routes in which certain departments, production associations (or groups of them), and territorial administrative organs are interested, based on share ownership, cannot be ruled out in the future. These routes can be operated on the same basis. Consequently, the possibility that the property on individual routes or sections, mainly permanent installations, will be in joint stock ownership is not ruled out. In such cases, the railroad will become one of the shareholders or will assume the maintenance of such routes and sections under contractual conditions.

It seems advisable to review the ownership of property on routes and sections in the existing system which have little traffic. After all, less than 1.5 percent of the freight turnover is handled on 17 percent of the sections (in proportion to their operating length). That is, the density of freight traffic here is such that the freight turnover on these sections can be handled by just one pair of full-weight trains per day. The production cost of transport exceeds the average for the system by 20 times as much or more.

The profitability of little-used lines, mainly sidings, has to be calculated, the prospects for changing the freight and passenger flows on them has to be determined, and the number of shippers and consignees of the freight being carried has to be established. The results of this work will provide a basis for decisions on transferring the property for ownership or lease by production associations or territorial organs. In certain cases, the property may be transferred to ownership by administrative and territorial formations. And obviously, we must provide railroads with the opportunity to conduct a technical inspection and maintenance on the lines in little use which have been transferred to ownership or lease by nontransport organizations under contractual conditions, which will increase the railroads' income without any detriment to operations.

In current economic activity, the relationships between railroad transport and the state budget should be based on the payment of a tax on profit. It is also desirable that transport's payments to the budget be confined to this tax. As far as transport's relationships with local budgets are concerned, if the appropriate fees are introduced, they should be differentiated in accordance with the correlation of transport in local and transit services in the region. If the transit freight and passenger flows predominate on a certain route, then it is legitimate to set the fee higher than the average, but when local traffic predominates, it is lowered.

It is advisable to form relationships between the railroads and freight owners on a contractual basis under the new conditions. The state order for transportation has to be reduced to a minimum. In order to fulfill the state order, if it is retained, the state should provide transport with the necessary resources at firm prices. Obviously, it is expedient for state economic organs to provide the Ministry of Railways with a list of priority freight.

The plans for freight shipment will be drafted by the railroads themselves, proceeding from contracts with freight owners on the basis of marketing—a system of managing production and product sales taking comprehensive study of the market into account.

The view being popularized among specialists at present is that the transportation activity of railroad transport should be based on detailed monthly plans as the most practical ones. In fact, these plans contain more detailed information now. In addition to the planned transport volume, they specify the railroads of destination in direct service and the stations of destination in local service, as well as the types of railcars required for the service. At the same time, it is perfectly clear that this information is insufficient for planning transport development and work to increase throughput capacity in specific directions. It is possible to make use of the results of special forecasting research for this purpose, of course. But first of all, as much information as possible needs to be obtained from the freight owners when the contract is concluded.

For the data to be complete and substantiated, a system of preferences (exemptions) in the form of specific guarantees or reduced tariffs has to be used. Freight owners may be given an incentive, let us say, to provide the "addresses" of shipments (destination points) not only for a month, but for a year; to an even greater extent, for a 5-year period. But it is legitimate to impose a higher fee for the shipment of goods on presentation.

At the same time, financial responsibility has to be stipulated in contracts between railroads and freight owners (in the form of a forfeit) by the latter for changes in the volume of freight presented for shipment, compared with the volume specified in the contract.

A provision such as this can also be introduced: if the freight owner is committed to present three percent more freight for shipment in the planned period than in the preceding period, let us say, the shipper is granted a special wholesale discount.

I foresee an objection: this procedure may stimulate an unjustified increase in shipments, they will say, and consequently, an increase in transportation costs in the national economy. However, that is incorrect. In the first place, under the new economic conditions, freight owners will be carefully correlating results and expenditures, including transportation expenses. Secondly, there may be state influence on transportation for the purpose of selling it. Based on the data for production siting, zones for efficient shipment of the most important goods,

similar to existing patterns for the best ("normal") freight flow directions, can be developed. The railroads should acquire the right to collect a fee for transporting freight outside the limits of these zones in accordance with contractual rates.

### **Economist Interviewed on Railway Economic Programs**

904H0210A Moscow GUDOK in Russian 23 May 90  
p 1

[Interview with Sergey Nikolayevich Zhuravlev, head of the Economics Division of the All-Union Railroad Transport Scientific Research Institute, by L. Kiryushina: "Market Premonition"]

[Text] Anyone today who is interested in economic problems has certainly noticed how lively readers responded to the appeal by our editorial board and the ministry to express their ideas concerning market relations in rail transport.

Today we have given S. Zhuravlev, head of the Economics Division of the All-Union Railroad Transport Scientific Research Institute, an opportunity to express his views on this topic.

[Kiryushina] Sergey Nikolayevich, rail transport, like any other, provides services: it hauls people and freight. Such activities have a most direct bearing on commerce (true, in recent years we have used this word with a negative connotation). That is why I would like to know, what does the Ministry of Railways have to do to increase the volume of services?

[Zhuravlev] It is not quite clear from your question what concerns you more—services as such or as a type of commercial activity. I am in favor of everything that is beneficial to and needed by the population, owners of goods, and, of course, the railroads, but not to the detriment of shipments. I emphasize this because under market relations, participation in the shipment process may prove to be not the most advantageous matter. Therefore, there is one criterion here: everything must be directed at increasing the quality of transportation service in its broad sense, plus provide an economic benefit.

Today, the lion's share of the revenue is provided by shipments, freight shipments (on the order of 60 percent). However, I believe that we should not count on increasing them substantially, if only because materials and metal consumption of the product will decrease and fuel consumption will be reduced. People have a natural desire to decrease production costs, including for shipments. Like it or not, we will have to find additional sources of revenue and offer the market new, non-traditional "goods."

I am confident that considerable opportunities will open up when creating certain material and legal conditions in this. For example, let us take the creation of hotel and tourist complexes at train stations and major stations, or

a network of inexpensive, economical stationary refrigeration plants with low labor-intensiveness of servicing. Locating the latter at centers for loading perishable agricultural products will make it possible largely to get rid of losses that are ruinous to the country. In doing so, the railroad workers will be none the worse off for it.

[Kiryushina] What kind of rail transport do you see in market conditions?

[Zhuravlev] The market is the seller, the commodity, and, finally, the buyer. And the manufacturer and the consumer take advantage of free market prices. Rail transport today, and in the next 10 years, will inevitably maintain its position of a monopolist, particularly in shipments over long distances. And where there is a monopoly, there cannot be a free market, since there is no free buyer. This is a truism. Consequently, prices in such a situation, for the most part, should remain under state control.

At the same time, with market prices for locomotives, railcars, rails, and so forth, the state should guarantee society reliable and quality transportation service. That is, everything that society needs, but is knowingly unprofitable or not very profitable, should be financed not by using sector funds. Otherwise we cannot talk about true cost accountability. What kind of a real manager would undertake something that is unprofitable for himself?

For the time being, a wasteful situation is constantly present in rail transportation. I have in mind the operation of subways, the BAM [Baykal-Amur Mainline], and all suburban passenger transportation. All this costs hundreds of millions in losses for the railroad workers, who presently are already in considerably worse conditions than workers of the majority of sectors of the national economy.

I believe the state should set prices for shipments, taking into account the market prices, and expand the sphere of application of contract prices, granting greater rights to rail transportation in these matters. It is also necessary to use funds of the union, republic, and local budgets for financing the sector, in addition to the sector's own funds.

[Kiryushina] A month ago, I had the opportunity to look over the so-called "black list" of everything that the Ministry of Railways has decided not to lease to jurisdictional collectives. Since the list is fairly extensive, I will name only what was agreed upon: locomotives, railcars, containers, track machines, motorized railcar rolling stock (true, with concurrence of the ministry), and, in addition, industrial enterprises, contract organizations, cultural and educational institutions, sports and health institutions, housing and municipal services enterprises and organizations, and trade and public catering enterprises and organizations (but without the right of redemption). Could you comment on this decision?

[Zhuravlev] I believe that leasing is the most realistic way to break up state ownership and destroy the administrative-command system. And although we need to "destroy" it quickly and decisively without limiting ourselves to half-measures, half-steps, and other "half-things," we must see to it that we ourselves do not end up under the wreckage and do not weigh down others. And this is quite possible, if you consider that we know how to administer and command, but have not learned how to apply economic methods, think economically, and play through and model the economic situation, as chess players say, several moves ahead, although we often fail to realize this. But economics, with its many aspects and many factors, is somewhat more complicated than chess, and the consequences of mistakes and miscalculations here are somewhat more serious. I think everyone would agree with this.

So, in answer to your question, I will say that I like leasing and am ready to welcome and support it everywhere that it can lead to positive results. However, I am confident that in our sector, given the specific nature of its economics, it requires more temperance and caution, more responsibility for the possible consequences, and not only for the railroads, but also for those people and the freight the transport.

In making proposals on leasing, we must thoroughly examine everything associated with it. If it is a question of leasing, say, a passenger train (and I recently came across such a proposal), it is necessary to say immediately who will pay for repair of the cars and locomotive and for maintaining and renovating track, who will take up the social problems of leaseholders, and what in general such a leasing enterprise and its collective are.

I believe that, first of all, we could consider leasing enterprises not directly involved in the shipping process. For example, in passenger service, in the area of loading and unloading operations, and in the area of repairing rolling stock. It is necessary only to isolate enterprises from direct operational (traffic) work, that is, approach them informally if necessary to change their production functions.

I believe we could lease various railroad workshops, small plants, scientific research institutes, and design bureaus. Fears that after being leased they might refuse activities necessary for rail transportation or raise prices for their products, in my opinion, are unfounded. All these problems probably would be resolved by making appropriate stipulations in the contracts.

In my view, leasing will be simpler in places where it is possible to enter into direct bilateral relations with clientele, be in the population or enterprises, and it will be considerably more difficult in places where economic relations are limited to within the sector. But to do this, it is necessary to overcome the main obstacle: the lag of

the material-technical base, the outrageous supply situation in conditions of a general shortage and chronic shortfalls in the delivery of rolling stock and other equipment.

The situation is made worse by the lack of practical experience in operating in market conditions, a low degree of economic competence, and a lack of a full understanding of how leasing relations interact with the economic mechanism. Recently, one of the publications (with reference to me) reported that the Ministry of Railways had fulfilled its profit plan (failing to fulfill the shipments plan) by leasing the railcar fleet. This report is absolutely incorrect, especially since lease payments do not go into profits but go directly into the production development fund. An economist with the slightest degree of competence knows this.

[Kiryushina] Readers of GUDOK call attention to the cumbersome nature of our sector's management structure and believe that if it remains stable, we cannot avoid major economic troubles. What would you say on this account?

[Zhuravlev] One of the main shortcomings of the existing structure is that higher management levels bear virtually no economic responsibility to the lower levels. With the objective need for centralized control of the shipping process, the ministry is excluded from cost-accounting relations. In my opinion, we can overcome this contradiction by including the appropriate administrations of the Ministry of Railways in sector cost-accounting associations. Such a restructuring should not disrupt the technological unity of the shipping process, which means we cannot avoid a formal transfer of structural units and enterprises from one subordination to another without changing their functions. In individual cases, we will even have to transfer, contrary to what seems to be common sense, certain fixed production assets from one to another. For example, mainline locomotives to the transport workers.

[Kiryushina] Recently, there was a report that effective 1 July of this year a specially created body would assume control of property of the union departments. But after all, the departments are powerful precisely because they own the fixed assets. Will the authorities really deprive them of these assets?

[Zhuravlev] I have not seen such a document. Therefore, I can only state my own proposals. Today the property of many enterprises of industry, power engineering, transportation, construction, and others is in union ownership. The union ministries and departments act as the representative of the state as the owner. They are the ones who transfer this property to the disposal of collectives on some or other terms, let's say, they lease it. With the transition to a market economy, many ministries and departments will be eliminated. Consequently, we need a body that is able to look after the state property. I think it would be proper that it work, if not under the direction of, then with the direct active involvement of the USSR

People's Deputies. It can be expected that the republics will follow the same path. If the sectorial ministry is preserved, it will, as before, represent the owner, although possibly with certain limitations. I think this is precisely the position in which the Ministry of Railways will end up.

### New BAM Sorting Yard Readied

904H0209A Moscow GUDOK in Russian 18 May 90  
p 2

[Report by GUDOK correspondent T. Andreyeva: "A Gravity Yard Helper!"]

[Text] Tynda—A new sorting complex has begun operating at Tynda, the largest junction station on the BAM [Baykal-Amur Mainline], immediately increasing the throughput capacity of the entire Baykal-Amur Mainline. The railroad workers received it for operation back in April, but it took a month to perfect the technology and check out the technical communications facilities. And the attending personnel also had to accumulate experience. But now the flow of railcars is passing through Tynda unimpeded.

I asked Vladimir Nikolayevich Kornilov, the chief engineer of the Tynda Division, to comment on this event.

"We are grateful to the construction workers of 'BAM-transstroy' and General Contracting Train No 573 of the 'Tyndatransstroy' Trust. They built the sorting complex outside of the plan and quickly. In May last year, there was only a piling area at the site of the gravity yard and compressor house. The weekly meetings of operations staffs under the supervision of S. Volkovinskiy, the deputy chief of the 'BAMtransstroy' Association, helped to coordinate the efforts of the general contractor and subcontractors. I hope that the remaining work will be completed just as rapidly; they have made a pneumatic shuttle, drainage gutters, and improvements in the area."

This is minor compared with what has been accomplished, of course. The estimated cost of the entire complex, incidentally, is more than 20 million rubles. It must be said that we have obtained a large facility, generally speaking. There are two gravity yards in the complex—of small and medium capacity, an arrival area which enables us to accommodate the trains coming from four directions, a sorting yard with 13 tracks, and equipment for automatic gravity yard centralization, as well as other facilities.

This complex makes it possible to shorten the layovers of transit railcars and speed up the delivery of freight to consignees. Back in March we had "bottlenecks." They were leaving trains outside Tynda, and up to 600 cars accumulated at times. This problem has not arisen since the sorting yard has been put into operation. It is able to process over 2,000 cars per day. For the present, though, it is operating at half capacity, but in the third quarter the freight flow will double. By that time the sorting yard's automatic control system will begin functioning.

The electronics will make the work easier and help to manage the heavy flow of railcars.

### Press Conference Highlights Improved Passenger Service

904H0209B Moscow GUDOK in Russian 22 May 90  
p 1

[Press conference by V. Shatayev, chief of the Passenger Main Administration, Ministry of Railways, as reported by V. Vasilyev: "A Guarantee Was Not Heard"]

[Text] As already reported, a new train schedule is being introduced in the system on 27 May. This was the subject of a press conference held yesterday at the Ministry of Railways. It was held by V. Shatayev, chief of the Passenger Main Administration.

Just what is the sector doing to meet the public's needs? During the heaviest passenger traffic period, there will be 1,094 train pairs in long-distance and local service and 8,850 pairs in suburban service in the system. The volume is also being increased by the large number of longer consists—20 to 24 cars. There will be 225 such trains. About 500 nonstop cars are being assigned in 316 services. The arrangements for making up consists have been revised, which will make it possible to carry an additional 10,000 persons each day. The number of international runs is being increased with additional trains and nonstop cars.

During the peak periods of passenger traffic, more than 1,500 additional ticket offices and points to accept ticket orders are being opened, and their hours of operation are being extended. New city railroad ticket offices are being opened in Mogilev, Kostroma, Magnitogorsk, Omsk, and a number of other large populated areas. In the Moscow office, tickets may be ordered by telephone for the first time, with home delivery for railroad employees and servicemen.

In a word, pay your money and travel. But whether there is confidence that after leaving point "A" you will get to point "B" exactly on schedule—no guarantee was heard in response to this question from the GUDOK correspondent. And it is not surprising. After all, not only the Passenger Main Administration, but other subunits provide for the schedule, and their representatives were not present at the meeting with journalists, unfortunately. The measures to ensure that train traffic operates strictly according to schedule are not entirely clear, either. Experience shows that directives from the top have little effect here. Economic sanctions against railroads for disruption of the schedule and compensation to passengers for lateness are already knocking persistently at the door.

One piece of pleasant news: increased rates for passenger service are not being planned with the shift to a market economy. However, V. Shatayev stressed, the Ministry of Railways has suggestions in this regard.

Yu. Novakovskiy, chief of the Central Railroad Passenger Service Bureau, and V. Dontsov, deputy chief of the Moscow Railroad, took part in the press conference.

### Freight Car Turnaround Problems Cited

904H0209C Moscow GUDOK in Russian 22 May 90  
p 2

[Article by G. Vasilyuk: "Stretching the Railcar"]

[Text] Chita—The car turnaround problem in general, and their loading and unloading in particular, has been a difficult one for many years, and it also periodically threatens to completely paralyze transport. How many decisions have been made on this, how many long articles and angry reviews have been written, and how many fines have been imposed... But nothing has been accomplished.

The use of rolling stock on the Transbaykal Railroad and at enterprises in Chita Oblast has always been poor or tolerable. It has never been good. The previous railcar crises in 1984 and 1986 come to mind. But now the situation has become worse throughout the railroad system. Representatives of all sectors, the press, and pensioners have become involved in the controversy surrounding the lack of railcars... Only the pioneers are not involved, it seems.

From an official letter from A. Kalabukhov, general manager of the "Chitakhleboprodukty" Association: "The layovers of rolling stock at the Borzinskiy Grain Elevator are extensive. The main reasons are the lack of regular personnel for freight handling operations, the poor material and technical base, the good-for-nothing track development, and the low wages. Relations with the Borznya Division of the railroad have a negative effect as well. First of all, preparation of the siding for the elevator is not being handled by a station locomotive in a timely manner. Often the cars accumulate at the station and are released without taking our capabilities and production technology into account. Secondly, the railroad has switched to computer processing of reporting data, and there has been complete confusion in taking the layovers into account. Data come to the computer not after 18 hours, as provided by the Railroad Regulations, but in 14 or 15 hours, which leads to their doubtful authenticity."

But here is an opinion on the excessive layovers from the opposite side. It does not specifically concern the Borzinskiy elevator, but the situation is roughly the same everywhere. From an official letter from V. Krylov, deputy chief of the Transbaykal Railroad: "The existing sanctions are ridiculously low for enterprises and organizations, especially as they are not being paid out of their own pockets. However, it cannot be called an 'emergency' situation, because this is the result of the decades of 'order,' when the railroad was obliged to unload and store freight coming to the oblast's kolkhozes and sovkhozes by numerous decrees of the 1950's and 1960's which still have not been rescinded. And they are in no hurry to take them out of the freight yard. When the cars

are unloaded by the railroad itself, it does not have the right to recover a fine from them for the layover.

"The opposition of railroad workers and their clients has been well known for a long time. Both sides are right in their own way, but this does not make it easier for anyone, or for the entire national economy, by the way. In order to smooth over the differences, we have had to establish loading and unloading staffs under government organs. But experience has shown their lack of competence and at times their complete helplessness as well.

"There is a prospect for resolving the railcar problem in the general direction of world technical progress, integrating systems, automatic control of freight shipments, transport-warehouse systems, and so forth. We are lagging far behind here. Even normal containers are being developed here extremely slowly. And the problem is not simply the vast scope of the country, the lack of facilities, and the technical backwardness, but the absence of truly economic relationships between the railroads and enterprises. Let us hope that a regulated market will put everything in its place here in time."

But what is to be done today? Here is what ordinary workers think about this. **From a letter from war and labor veteran N. Kurochkin:** "There has always been a car unloading problem, even in the long distant 1930's. How were they solving it then? The trade unions formed detachments and sent them to unload. They were led by members of the workers committees and local committees. They worked without pay on Sundays and weekdays after work. Hundreds of loaded cars are standing idle now. Can't we really arouse the enthusiasm of the 1930's during a period of democracy, even for pay?"

Well this is a sincere suggestion from a veteran, and it may still stand us in good stead, how do we know? All the same, it is to be hoped that another experience will come closer to the point. For example, the experience of the Chita Meat Combine, where quite recently they were paying huge fines for the above-norm layover of rolling stock, but now they have begun to decline sharply. Just how did this enterprise, which is far from the best in a technical sense, achieve this?

**From an interview with L. Nagornoy, freight handling foreman at the meat combine:** "We are working with the cars around the clock now. If they come in at night, we bring the freight handlers in by a special bus, give them hot food, and pay them accordingly. And afterward we take the people to their homes by the same bus. We began getting accustomed to this system after we were convinced that it costs considerably less than the fines for layovers."

Realizing that the worsening situation in transport threatens their personal welfare, people are giving every possible kind of advice, much of which is impracticable. But if we gather the grains of common sense, it is quite possible to develop some kind of new system for working with freight. For example, V. Semikov, a former machine operator in a subdivision for freight handling

operations, wrote in a letter that often it is possible to send cars for unloading only at night because of the accumulation of cars, thereby "assuring" many clients of fines for excessive layover. He suggested that large subunits—freight handling shops working around the clock—be set up at stations through the budget of local soviets, which will levy a special tax from enterprises for transport and freight handling expenses. In this way, the rolling stock will be processed more rapidly and without undue delays. Once a car has been emptied of the consignee's freight, the switching brigade will immediately send it for loading with a shipper's freight, and after it is processed it will be included in the very first train that is made up. Rolling stock will not accumulate at the station, and freight will be in the freight yards.

This suggestion is not a new idea, of course, and there is an element of the impracticable in it, because the organization of such shops is a protracted matter (in addition, he suggests that the sluggish freight handling subdivisions be abolished). But the author's suggestion that the indicator of tons processed in freight operations be rejected and replaced by the indicator for car turnaround, which is common to all freight shops and stations, has already begun to materialize practically.

Our discussion is probably incomplete without a controversial statement by one of the well-known journalists. It is important because it extends the horizons of the search for answers to the questions we have posed. There is no question that the problem of railcar crises depends to a greater extent on overall transport technology than on loading and unloading. From an article by V. Selyunin, "The Winter of Our Anxiety" (OGONEK, No 12, 1990): "At a given moment, only five of every 100 cars are being loaded and unloaded by consignees, four of them legally, but one is being held up beyond the time that was set... So where are the rest of the hundred cars? Only 22 cars are moving quickly or slowly for the Ministry of Railways, and the rest are standing at intermediate, technical, and freight stations, and the consignees are not involved in any way."

It is possible that the figures cited in the article are not entirely accurate. But it is important that the trend itself is correct—the slowdown in rolling stock turnaround is taking place primarily in railroad transport itself. So the answer to the question of why the railcar has become a stumbling block in the way of freight transport lies with the fundamental renovation of the railroads.

So no one can provide quick and all-embracing formulas at present. The only thing left is not to waste effort on "stretching the car" between railroad workers and clients, but to bring order to each of them in their work to the extent possible.



### Chernobyl Area Rail Operations Examined

904H0209D Moscow GUDOK in Russian 22 May 90  
p 2

[Article by N. Golovanyuk, chairman of the dorprofsozh [Railroad Committee of the Railroad Transport Workers Trade Union]: "You Cannot Detour Around Chernobyl"]

[Text] Kiev—Now, following the sad date—the fourth anniversary of the Chernobyl tragedy—one keenly experiences two feelings: the most profound gratitude to the railroad workers and transport construction workers who took part in putting an end to the emergency at the AES, and a great deal of guilt for those who were burned by the atomic fire in one way or another.

Engineers, train makeup men, and track workers worked under the power-generating unit itself, around which a concrete housing was erected. They delivered metal structures and laid tracks. And the Kiev metro builders were the very first to arrive here. After them came subunits of the "Yugozaptransstroy" Trust. A detachment of bridge builders was also ready to come.

After the sarcophagus was built, railroad and construction workers concentrated their efforts on rebuilding the route from Yano to Chernigov. At the same time, they ensured continuous delivery of freight for construction of the power workers' city of Slavutich. It is impossible to overstate their contribution to deal with the aftereffects of the catastrophe. However, the concern for those whom fate had willed to be in the dark shadow of Chernobyl did not turn out to be equal to their contribution. But in the meantime, the people's anxiety is increasing and turning into despair. The radioactive stain spreads inexorably, making more and more new persons hostages of Chernobyl. It is becoming dangerous to make use of the forests and reservoirs or work in the gardens and fields. In many places it is simply impossible to live.

In the contaminated zone there are 37 stations and 500 kilometers of main tracks on the Southwestern Railroad. About 32,000 railroad workers and members of their families are living in an area with a higher radiation background in Zhitomir, Kiev, and Chernigov Oblasts. They include nearly 9,000 children, a little less than half of whom are of preschool age.

About 80 million rubles has already been spent to cope with the accident. This is only for capital investments, 22 million of which are from the railroad's funds. In addition, another 15 million have been used for decontamination, repair and track operations, and the increased operating expenditures of the Southwestern Railroad. However, a considerable amount of this money was wasted for nothing. Because of the lack of reliable information on the ecological situation in the region, new settlements have turned out to be on contaminated land. The blunder came out at a decontamination center, the station of Nedanchichi, and many other sites.

Records show that the number of appeals for medical assistance rose sharply after the accident at the AES. Hospitalization has increased by 1.5 times as much. The sickness rate of women has risen by 1.5 to 2 times as much. The effect on children has been especially alarming. Every fourth child living in the contaminated zone is ill. Many are observed to have an enlarged thyroid gland and blood pathology. There is a sharp decline in immunity among the population.

People are also worried about the unpredictable after-effects in the future. Especially as quite a few mutations are being observed in the animal and vegetable world. All this has become a reason for the rush to leave, to change one's place of residence. In the Korosten Division today, there is not one enterprise that could fill more than 75 percent of its complement.

Nearly 800 railroad workers were discharged in the second half of last year alone. They include 84 engineers, 70 mechanics, and 97 track repairmen. And 334 persons have left in two months this year. About a hundred railroad workers have put in an application. The turnover is being held up only because of the lack of housing in other parts of the country.

Urgent and emergency steps are necessary. The railroad requires specific and immediate assistance. It is estimated to cost roughly 220 million rubles.

In order not to paralyze the work of the Korosten junction, we need to speed up construction of housing in the uncontaminated rayons and hotels in Korosten for a transition to the shift method. We need to engage more actively in modernizing the stations, junctions, and enterprises located in the contaminated zone. This will make it possible to move the maximum number of persons out of there.

It is understandable that railroad workers on the Southwestern Railroad cannot cope with such a gigantic task themselves. But the position of Ministry of Railways managers is not understandable. All of 4 years were required after understandings were reached for them to finally consent to a joint meeting between the ministry collegium and the presidium of the trade union's central committee. But they had prepared for it poorly; this was the view of the numerous representatives of labor collectives and trade union organizations that took part in it.

It turned out that certain managers of main administrations are not familiar with the situation locally and have no sense of it. For that reason, the draft decree that was proposed did not stand up to any criticism. It is shameful to say so, but with the availability in the ministry of several scientific institutions and an entire army of scientists, no research has been done on the zones at risk. No specialist has been found who can draw an accurate picture of the situation that has developed and provide even simple recommendations for railroad workers and their families to maintain their health and fitness in contaminated localities. Indignation of the minister of railways in this regard is obviously overdue.



Naturally, such a collegium was unable to adopt a sensible document. And they correctly decided to give the draft decree to a commission for completion, with subsequent discussion of it at meetings and conferences of labor collectives dislocated in the territories that have been suffering. But what a surprise it was for us when we read the new draft, from which many important provisions and requirements had been dropped. As an example, a question was raised at the collegium concerning the need to include topics related to elimination of the aftereffects of the accident at the Chernobyl AES in the plan for the sectorial scientific research institutes without delay in order to continue study of the situation on the contaminated territory. In the draft of the decree, already prepared, it refers to the next five-year plan... Why?

Requirements such as providing uncontaminated produce without charge for 2,000 children of preschool age who do not attend kindergartens and nursery schools and providing preferential travel vouchers for students 14 to 17 years old were also dropped. The procedure for providing uncontaminated produce from the Korosten Division and specifying the funds for their delivery was not reflected in the decree.

Or what about the point on the organization of radiation monitoring by the railroads' managers when nothing was said about where to obtain the instruments, which we do not have?

A remark by one of the commission members grievously insulted the Korosten engineers: if the division comes to a stop, we will detour around it.

You cannot detour around Chernobyl! It will be a curse on the administrative-command system for eternity.

A large group of specialists from the ministry who came to Korosten after the collegium did not set the people's minds at rest. Their concerns and anxiety did not sink in. So there will be no peace, and everything will take its course.

Hence the conclusion: there should be an ecological collegium of the Ministry of Railways with a trip to the site, to Korosten. It is time for the headquarters commanders to restructure their work, to tear themselves away from the railcars and look at the people. The last combined and expanded collegium was the first small step in the direction needed. The people approved of it, but a second and a third one are needed...

Railway workers are hoping for help from the government. It would be completely fair for the Ministry of Atomic Energy and Industry to compensate the Southwestern Railroad for its expenses, if only in part. But as we know, they are already reaching 40 million rubles. But first of all, assistance from the ministry itself should be more substantial. It is not obligatory to improve people's health just in the Crimea, for example. There are resorts in our country within the bounds of other railroads.

Or an important question such as settlement farther away. The people in the Ministry of Railways who are in charge of personnel matters should study this. After all, specialists are required on many railroads, and there is a record of where housing is available. We must help families with children to move.

While joy is alone in transport, misfortune should be alone as well. After all, this is a unified organism. Our railroad workers have performed their duty to the end. And today the Korosten Division is one of the best in the system, according to the indicators. It is our common sacred duty to help those who have fallen into misfortune.

### First Quarter Rail Accident Statistics Published

904H0190A Moscow GUDOK in Russian 25 Apr 90 p 2

[Report on first quarter rail accident statistics, based on materials from the USSR Ministry of Railways Traffic Safety Main Administration: "Traffic Safety in the First Quarter"]

[Text] The traffic safety situation in the system has deteriorated sharply this year. Compared with the same period last year, the number of wrecks has increased by 55.5 percent and the number of accidents rose by nearly one-third as much. The incidents took place on 21 railroads. The October Railroad had five wrecks and an accident; the Kuybyshev Railroad had four wrecks; the Azerbaijan, Moscow, Tselina, and Central Asian Railroads each had two wrecks; the Gorkiy, Southern, and Southeastern Railroads each had two accidents; and the Alma-Ata Railroad had a wreck and two accidents. The 10 railroads had 64 percent of the total number of wrecks and 70 percent of all the accidents. The employees of practically all main administrations (except Electrification and Power Supply and Passenger Main Administrations) were at fault for incidents of every kind.

The higher accident rate in passenger traffic is creating concern. Passenger trains were wrecked on the Transcaucasian, Azerbaijan, and October Railroads because of collision with freight trains, and they were wrecked on the Moscow Railroad because of track failure. Four passengers were killed and two were injured in an incident at the Pambak station in the Yerevan Division of the Transcaucasian Railroad. Two passengers were injured on the October Railroad. A passenger train locomotive brigade was killed in a collision in the Nakhichevan Division of the Azerbaijan Railroad. Incidents with such consequences have not been seen over the past year and a half.

Three out of four wrecks were the fault of locomotive engineers. The locomotive administration has had six wrecks this year, compared with one in the first quarter last year.

Passenger train No 587 from Novorossiysk to Yerevan was traveling over the section between Sanain and Kirovakan in the Yerevan Division on 12 February. Locomotive driver Sh. Sarkisyan from the Leninakan depot passed the Pambak station without stopping, although the schedule called for a 3-minute stop. After passing a red departure signal, the train collided with a "string" of four electric locomotives arriving at the station. The engineer's assistant warned him twice in passing the station: "We are passing on a red signal!" The engineer confirmed his "alertness" by repeatedly pressing the appropriate lever. The first-class engineer stated the reason for his actions this way: "...there was a grade ahead and I was afraid to be delayed; I thought the green signal would go on."

The explanation of what took place is criminal presumptuousness. Incidentally, engineer Sarkisyan and a number of his coworkers from the Leninakan depot also failed to adhere to the schedule previously in driving train No 587. As a rule, they passed the Pambak station without stopping, and no one prevented this from happening.

A locomotive brigade from the Leningrad-Passazhirskiy-Moskovskiy depot who had fallen asleep on the Leningrad-Malaya Vishera section of the October Railroad on 4 March allowed an uncontrolled passenger consist to move spontaneously in the opposite direction. It collided with train No 181 en route from Nikel to Moscow that was coming after it. The locomotive brigade, consisting of two engineers, had shorted out the circuit for the device to keep the engineer awake, putting the ALSN [presumably: automatic locomotive warning device] out of commission at the same time...

The persons responsible for the 8 March accident on the Alma-Ata Railroad in which a diesel engine and nine cars were derailed was a locomotive brigade from the Pishpek depot that had gone through an inhibiting passing signal. Engineer Umarov's legs were seriously injured. He had been relieved of his position on two previous occasions. However, he was given a positive evaluation even after the incident.

Train collisions for which locomotive brigades were at fault also took place on the Far Eastern and Transcaucasian Railroads. After leaving freight trains on grades without braking them, brigades from the Khabarovsk and Khashuri depots abandoned the cabs of the electric locomotives. The trains started moving and collided with consists arriving at the stations.

In three months, engineers and their assistants passed through warning signals 33 times throughout the rail system; this includes three cases each on the Moscow and

Southern Railroads. There is practically no reduction in the number of cases in which locomotives are damaged.

The situation in the Container Transport and Commercial Work Main Administration has deteriorated significantly. The number of work defects has increased by one-third as much over last year. Cargoes have gotten loose 40 percent more frequently. The largest number of these violations occurred as follows: five on the North Caucasus Railroad, four each on the Lvov and West Siberian Railroads, and three on the South Urals Railroad.

In January, a unit freight train hit a metal bar which had fallen off the last flatcar of a train ahead on the Orsk-Orenburg section of the South Urals Railroad. Toxic material leaked out of the rolling stock that was damaged when it derailed. People had to be evacuated from this area. Flagrant violations were committed in loading the flatcar at the Ust-Kamenogorsk Metallurgical Combine. Employees of the Zashchita station, who accepted it from the shipper, and the management of the Zashchita Division of the Alma-Ata Railroad did not require either loading diagrams or details on the fastening of the zinc bars from the shipping combine, in spite of the reports received previously from other railroads about loads that were tied down poorly.

Most of the accidents—47 percent—were the fault of employees of the Lines Main Administration, as before.

The number of cases involving defects in train and switching work in the rail system declined by 4.6 percent. At the same time, the number of cases increased on eight railroads and as a whole in the Signals and Communications, Electrification and Power Supply, Container Transport and Commercial Work, and Passenger Administrations (the fleet of railcars).

The situation that has developed in the first quarter was reviewed at a session of the Ministry of Railways Collegium. G. Kozlov, deputy minister and chief of the Traffic Safety Main Administration, delivered a report. It was noted that urgent steps must be taken because of the traffic safety situation on a number of railroads, chiefly the October, Kuybyshev, Transcaucasian, and Azerbaijan Railroads, as well as in the Petrozavodsk, Murmansk, Zashchita, Kazan, Yerevan, and Nakhichevan Divisions. The chiefs of railroads and chief traffic safety inspectors took part in the collegium's work. Some of them had to explain the reasons for the worsening safety situation.

A number of additional steps were taken at the collegium session. Employees of Ministry of Railways main administrations were sent to the railroads with the worst problems to provide assistance.

identification	Wrecks		Accidents	
	1989	1990	1989	1990
Total wrecks and accidents:	18	28	10	13
Total involving passenger trains:	2	4	6	8
<b>By Railroad:</b>				
October	3	5	2	1
Kuybyshev	2	4	1	—
Moscow	1	2	1	1
Azerbaijan	—	2	1	—
Tselina	—	2	—	—
Central Asian	1	2	1	—
Northern	1	1	—	—
Gorkiy	—	—	—	2
Lvov	—	1	—	—
Southwestern	1	—	1	—
North Caucasus	—	1	1	1
Transcaucasian	2	1	—	—
Volga	1	1	—	—
Alma-Ata	—	1	—	2
South Urals	1	1	—	—
East Siberian	—	1	—	—
Transbaykal	—	1	—	—
West Kazakhstan	—	1	—	1
Baykal-Amur	—	1	—	—
Odessa	—	—	1	—
Southern	—	—	—	2
Krasnoyarsk	—	—	1	—
Baltic	2	—	—	—
Kemerovo	1	—	—	—
West Siberian	—	—	—	1
Southeastern	2	—	—	2
<b>By Main Administration:</b>				
Lines	9	13	1	7
Locomotives	1	6	1	2
Railcars	3	5	1	1
Transport	3	1	5	—
Signals and Communications	—	1	1	—
Container Transport and Commercial Work	1	1	—	1
Passenger	—	—	—	—
TsTVR [Rolling Stock Repair and Spare Parts Production]	—	—	1	1
By nontransport organizations	1	1	—	1
<b>By Cause:</b>				

Passing inhibiting signal	—	2	1	1
One train colliding with another	—	3	—	1
Locomotive malfunction	—	—	1	—
Break in rail	5	9	—	4
Break in core of switch frog	1	—	—	—
Track disrepair	1	3	1	2
Faulty switch	1	—	—	—
Runaway car	2	1	2	—
Violation of switching operation rules	1	—	—	—
Shift of centralized switch under a train	—	—	1	—
Break in axle journal of wheel pair	2	1	—	1
Car part falling on track	1	2	1	1
Break in car part	1	1	1	—
Malfunction of STsB [Signalization, Centralization, and Block System] devices (false indication of authorizing signal)	—	1	—	—
Failure to close off track operations areas	1	—	—	—
Collision with motor vehicle	—	1	—	1
Loose cargo	—	1	—	1
Other causes	2	3	2	1

Consequences of Wrecks and Accidents	1989	1990
Persons killed (reports at time of wreck or accident caused by railroad employees)	4	9
Including passengers killed	—	4
Persons injured	4	7
Including passengers injured	2	3
Railcars wrecked	180	351
Railcars damaged	168	249
Locomotives wrecked	3	8
Locomotives damaged	10	4
Complete interruption of traffic, in hours	232	423
Single-track interruption, in hours	98	174
<b>Causes of Defective Work:</b>		
All cases	10,547	10,067
Including special cases	3,593	3,442
Receiving on track in use	2	4
Departing on track in use	4	2
Receiving and departing on unprepared route	8	7
Shifting switch under train	8	3

Runaway cars	19	18
Passing inhibiting signals and boundary posts	31	33
Damaged locomotives	1,675	1,674
Breaks in axle journals, axles, and wheels	47	58
Breaks in truck and spring rod frames	10	13
Departure with overlapping terminal cranes	14	5
Break in automatic coupler and center beam	508	490
Spontaneous uncoupling of automatic coupler	319	356
Uncoupling of cars from passenger trains because of technical malfunctions	47	41
Uncoupling of cars from freight trains because of journal box friction	815	677
Uncoupling of cars from freight trains because of a technical malfunction	1,214	1,174
Car parts falling on the track	107	98
Track operations not cordoned off	29	13
Loose cargo	25	35
Rolling stock collision	573	496
Total rolling stock derailment	2,107	1,975
Derailment of rolling stock in trains	144	143
Collision with motor vehicles at protected crossings	34	39
Collision with motor vehicles at unprotected crossings	168	163

### Rail Conference Examines Increasing Import-Export Freight Volume

904H0190B Moscow GUDOK in Russian 25 Apr 90  
pp 1-2

[Article by Ye. Khrakovskiy: "Trouble on the Export Production Line"]

[Text] Many years ago a topical satire with a very typical title appeared in one of the newspapers: "They Did It Very Fast." How much has speed and pressure cost our country where a thoughtful approach and a sober accounting were required first of all? In all the discussions about economic thinking, every time we encounter again and again the notorious statement "Let us have it, we'll examine it later." And we examine it, sighing and wondering how this could have happened, and we look for clowns to whom we can shift the blame. "Very fast" does not always mean "good"; often it turns out to be just the opposite.

I was thinking about this at the Ministry of Railways conference devoted to the sharp increase in the transportation of export and import goods. Taking part in the conference were officials from the Ministry of Railways, the Ministry of the Maritime Fleet, a number of railroads, divisions, and shipping companies, maritime

ports, port and border stations, and specialists from foreign economic, planning, and supply organs.

The government has adopted the decision to look for 10 billion rubles of additional output for export this year. We cannot increase our foreign trade debts endlessly. Some foreign partners are already apprehensive about concluding contracts with us. But the country urgently needs foreign exchange to buy grain, foodstuffs, consumer goods, and advanced equipment.

There is no need to demonstrate this at length—we must increase exports in every way possible. Unfortunately, we are selling basically raw material, fuel, and timber abroad at present. And in order to obtain the additional billions of rubles we want, we need to increase export shipments by millions of tons. The volume of cargo transshipment at ports will increase by nearly 70 percent. No one has seriously thought about how to deliver everything to clients practically. Clearly this has not been discussed with transport employees, they noted at the session.

It is even clear to a child that we must invest some funds to earn the billions. Otherwise nothing will be acquired. It is obvious that we should have thought for a while and found foreign exchange to charter additional ships and to equip the ports with up-to-date equipment. In many places the mechanized facilities are obsolete and are worn out to a significant extent. This fact was cited: nearly 80 percent of the loaders are worn out in Leningrad. And this is one of the best-equipped ports. And the port and border stations have quite a few gaps, some of which can be closed with the availability of funds.

We also should have thought about how to provide economic incentive to seamen and railway workers, possibly allocating for this a little of the foreign currency obtained or the imported goods acquired with it. It is not simple to induce people to work much more intensively today.

"In the first quarter our work volume increased by 30 percent," said V. M. Yevstigneyev, chief of the Riga Maritime Port.

"There is no money to pay people. A longshoreman now earns 500 rubles a month, but with the existing inflation and the critical shortage of commodities, this does not count as money. It is more and more difficult to find people for this work locally. But in order to bring a person here from somewhere, we must pay 25,000 rubles into the local budget. An emergency situation requires emergency measures. And we need privileges and incentives for people first of all."

In foreign trade, we have already been immersed in the elements of the market. And if the situation continues further this way, we may drown in them. About 13,000

enterprises and organizations have entered the international market. In recent months alone, 2,500 cooperatives acquired the right to such activity. The contracts with foreign partners, noted V. I. Alekseychik, the chairman of the "Soyuzvneshttrans" Association, often are concluded by persons who do not have the slightest understanding of foreign trade, market conditions, or marketing.

Is this really business when almost every mine is attempting to sell its coal abroad? It is not enough that they are beating down each other's price. At the ports, they have to set aside yards separately for the fuel of various proprietors, various types, and various purposes. It is extremely difficult to make efficient use of ships to transport it... How much is the country losing by this?

A typical example of bungling was mentioned. Coal was shipped to South Korea from our Black Sea port. The ship arrived after traveling thousands of miles over seas and oceans, but they would not accept the cargo. They referred to the high sulfur content. The coal does not conform to the standards imposed in this and many other countries. So here the seamen languished, not knowing what to do with their cargo.

The timber situation is very similar. L. M. Kislayev, deputy chairman of the "Soyuzpromeksport" Association, maintained that many Soviet enterprises are completely unprepared to enter the international market. As a result, several Soviet sellers of timber approach the same customer—Japan, let us say—right away. At the same time, who will miss the opportunity to beat down the price?..

But foreign practice is well known, after all. There are several foreign trade firms which deal in coal. They have highly skilled personnel who are thoroughly familiar with the business, who regularly assemble the information needed on the market situation, and who have well-organized international contacts. Why don't we establish such firms who could take a fair percentage for trade arrangements? After all, it is important for the miners and other exporters of a product to obtain foreign exchange and to purchase high-quality goods. And of course, the collectives of enterprises do not want to be cheated, to receive only a meager portion of what has been earned; this is what happens when they have to do business with domestic foreign trade organizations.

And how many problems are arising now with the licenses to export products abroad? Almost every speaker demanded that this matter be put in order in the shortest possible time. Over 8,000 railcars with cargo for export without licenses have been received on the October Railroad this year alone. What often takes place now? An enterprise or cooperative seeks to sell its product abroad as quickly as possible. There are no licenses yet, but they try to ship it by fair means or foul, and perhaps authorization will come soon or the matter will be settled somehow. Sometimes there is no contract,

but they load the product on the cars "on the off-chance." The pressure on railroad workers is tremendous. Contacts are sought to apply pressure on them somehow. Sometimes even bribes are made.

There is a similar picture at the port, where they do not want to accept a commodity without a license, without a formal contract, and above the plan. The litigation begins. Telegrams are rushed to all points from the product owners and the railroad workers squeeze the port workers. But for the present, the business is justice, and railcars that have been turned into warehouses on wheels form up in line at the port stations.

Many thousands of gondolas have been withdrawn from circulation; they are carrying coke in the Baltic, metal and mineral fertilizers at the Black Sea ports, and lumber and coal in the Far East. But they are not taking the fuel out according to plan in Ekibastuz, Karaganda, and the Kuzbass because of the lack of rolling stock. Confusion in any business turns into financial losses, but in rail transport, where everything is closely interrelated, the losses are especially high and the economy of the entire country suffers.

Railroad workers are disciplined and they have been trained to follow commands from the top.

"They have been putting pressure on us lately," said G. M. Fadeyev, deputy minister of railways, "telling us to ship everything that is produced. P. I. Mostovoy, deputy chairman of the USSR Council of Ministers, even threatened: whoever does not bring the goods for export will be taken to court. And thousands of cars have been rushing uncontrollably and without restraint to the ports. Many of them have been held up for a long time at the port stations. The seamen cannot handle such a huge cargo flow right away. But after all, there was a government decision on joint planning of export-import shipments."

How many times have we burned our fingers on the notorious "gross output?" Who does not recall the huge parking lot right after the earthquake in Armenia? We carried the freight without taking the possibilities of unloading it into account at all. And we had to put hundreds of consists on sidings nearby and far away. Operating conditions became critical in a vast region. A good impulse without elementary consideration brought only harm. Won't we really ever learn to draw conclusions from such obvious mistakes and miscalculations? Will impetuous impulses continue to bring a fever to our economy in the future as well?

N. P. Tsakh, deputy minister of the maritime fleet, noted that steps are being taken now to rectify the situation. Fishing and naval ports are being enlisted for the transshipment of export cargoes, and opportunities to charter additional foreign vessels are being sought. But we must make maximum use of our domestic capabilities as well. This means efficient planning and close interaction by all participants in the transportation process first of all.

We have to clear away the imported goods that are piled up at the ports more quickly. Thousands of containers without assignment orders have been standing here for a long time. And these are mostly consumer goods which are absent on our store shelves.

Grain must be taken out of the ports much faster. Those who spoke were amazed: "If a cloud appears in the sky, they stop unloading grain from the holds right away." The ships lie idle and the grain-carrying railcars wait for the cargo. This problem certainly can be resolved if there is a will to do so. But no one has undertaken to do this for years.

How many years have we debated the question of weighing cars with grain two or three times? But things are not moving. We have repeatedly suggested that the tare be taken into account in the conventional manner for grain carriers. There is one objection: underloading is possible. But what about the case cited at the conference? Cars carrying from 150 kilograms to a ton and a half of grain remainders are coming to Baltic port stations for loading. A cooperative has even had to be enlisted to clean them out. And shrewd persons have been selected here. If there is less than 100 kilograms of grain left over, they do not undertake the cleaning. It is not profitable for them. After all, the grain is to be sold. These are the kinds of grimaces in our methods of economic operation!

Many problems are associated with the increased volume of export freight traffic at border stations as well. No one at the conference could explain clearly why many hundreds of cars containing ore for Czechoslovakia are standing idle. Miscalculations in planning, the insufficient capacity of transshipment complexes on the border—our problem is widely known. A new complication has developed lately as well.

M. N. Grabskiy, chief of the Lvov Railroad, spoke about it. There are just three washing points left on the mainline. But they are also threatened with closure by "the greens." After all, fertilizers and other polluting freight continue to arrive in loose form. It is not enough that there are less and less persons willing to load them into cars on the West European gauge and there is no place to wash the rolling stock. So it turns out that many cars are on the railroad, but there is nothing to carry the imported freight in. The problem awaits a solution.

The managers of a number of railroads and divisions pointedly raised the question of improving the management of shipments and reinforcing mutual financial responsibility among railroad workers, port workers, foreign trade organizations, and clients. The Ministry of Railways now has a reliable computer capability. Why not organize information efficiently so that railroads and shipping companies know in advance what kind of export freight is being sent to them. Then they will be able to prepare in advance to receive it.

Many speakers stressed that we cannot live for today alone. We must think and be concerned about the long term. If we want to sharply increase exports, and the

country cannot do without them, we must begin developing the ports and port and border stations in earnest, without putting it off. We cannot continue to close our eyes to the fact that either tankers or railroad tank cars continue to remain idle at the ports because of the insufficient capacity of oil storage tanks. An example was given. When they began developing foreign trade in China, they built over 440 up-to-date transshipment complexes at the ports. We also need a program to develop the export-import production line, in which everything should be taken into account, weighed, and justified.

In summing up the discussion, Minister of Railways N. S. Konarev emphasized that fundamentally new approaches and new solutions are needed to cope with the task which the government has set for transport workers. A procedure for interaction between railroad workers and port workers is needed for serious perestroika. Many regulations and directions are out of date and need to be radically revised. The Ministry of Railways has to reinforce the subunits engaged in export-import shipments, and perhaps it is advisable to create a special main administration.

A group of competent specialists from the Ministry of Railways and the Ministry of the Maritime Fleet, with participation by representatives of foreign trade and supply organs, was instructed to prepare a detailed, specific program of actions for the current year and the long term. Its drafting probably cannot be dragged out, but it is not necessary to "do it very fast" as in that topical satire, either.

### Train Accidents Reported

904H0213A Moscow GUDOK in Russian 25 May 90  
p 2

[Article by V. Shevalye: "Through What Doors Does Misfortune Enter?"]

[Text] Misfortune has arrived—open the door wider. Several days ago, we talked about a fire on the railroad track in the vicinity of Karaganda. At the time, everything was settled in principle. And here is new news from the Karaganda Division: another misfortune.

At 20 minutes after midnight on 23 May, a diesel locomotive and seven passenger cars left the tracks at the 100 kilometer marker on the Zhana Arka-Gornyy Post No 117 line. The first four cars lay on their sides after the derailment. People were injured. Movement on the section was restored after 13 hours.

Based on the results of a preliminary investigation, it became known that a gondola car's wooden door had caused the accident. How did it get on the track?

Freight train No 3603 had traveled over this section the day before. The train had been made up at the station of Karazhal; however, having reached the rail junction of Atasu, it again fell into the hands of the train make-up

men—here, they uncoupled a hopper-batcher from it. As a result, a gondola car, which had just been rejected as defective for loading ore and which was being sent for repairs, was the rear one.

The gondola car's strength was only sufficient for a third of the journey. What happened further on—we already know. The fact is known that the four derailed railcars included a stores car, a mail and baggage car and two passenger cars, in one of which inductees were traveling to their place of service and in the other prisoners were being transferred to places not so remote. According to preliminary data, five individuals were hospitalized.

A group of specialists and directors from the railroad headed by A. Starodub, the Tselina Railroad chief, traveled to the accident site.

#### April Rail Accident Statistics Issued

904H0213B Moscow GUDOK in Russian 26 May 90  
p 2

[Unattributed article "Traffic Safety: April"]

[Text] The situation regarding the insuring of traffic safety remained unfavorable during April. Six wrecks and five accidents occurred on the network. As a comparison, let us recall that four accidents occurred during the same month of last year and there were no wrecks.

On the Moscow's Kashira Division, an accident involving a suburban train occurred through the fault of track workers who did not trouble themselves about a barrier at a work site and did not have time to remove a booster device from the rails before the approach of the train.

Irresponsibility also led to the derailment of a passenger train car on the Odessa's Kotovo Division. During the overhauling of an insulation joint, the track brigade leader allowed a train to pass after attaching the cover plate on this joint with only two bolts.

On the West Kazakhstan's Guryev Division, only a coincidence prevented very serious consequences from a collision between express train No 58 and a freight train on the Volgograd-Tashkent line. An investigation established that the freight consist, which was being driven by Shakhov, an engineer from the Guryev depot, and Strunyashev, an assistant engineer, was received on a siding to halt for the passage of the passenger train. Having passed the entrance signal with two yellow lights at a speed of 40 kilometers per hour and then the express "yellow" one, the engineer applied the service brakes only 200 meters before the prohibiting exit signal and the emergency brakes 20-50 meters before it. The engineer was not able to prevent passage through the closed traffic signal. The train stopped before the frog of the switch violating the clearance limits of the neighboring track.

At this time, the passenger train was approaching the pre-entrance traffic light with the permitting signal from the opposite direction at a speed of 80 kilometers an

hour. After passing it, the red and yellow light lit up on the locomotive's traffic signal. This was caused by the violation mentioned above. Nazarov, the passenger train engineer, reacted to it by switching off the automatic stop, which was operating well, and applying two degrees of service braking and emergency braking in direct proximity to the red entrance signal. The 60 kilometer-per-hour speed and the very short distance to the signal did not permit the avoidance of a collision between the trains. Fortunately, no one was hurt. Had the freight train halted several meters further on, the consequences would have been unpredictable.

Shakhov, the freight train engineer, has been on the "right wing"—since December 1988. In May of last year, he was reduced in position for a violation of braking procedures which led to the formation of slide-blocks in the wheelsets. In February of this year, he displayed reckless driving while approaching an inhibiting signal and, four days before the accident, he was forced to apply full service braking in front of a traffic signal with a red light. True, neither the depot chief nor the engineer instructor knew about the latter case. It only came to light during an inspection of the depot after the accident.

Nazarov, the passenger train engineer, had worked for almost 15 years without a reprimand. He has a higher education and a second class qualification. However, he loses his head in extreme situations—fog, a green input overlapping a red one. His incorrect actions are evidence of this.

A chain of gross safety violations led to an accident involving a passenger train at the station of Kochetovka Southeast. An unfastened group of railcars moving from one of the station's parking tracks collided with a consist being shunted. Eight railcars left the rails on the station's main tracks. Dorokhov, the shipping department chief of the Michurinsk Division who had arrived at the site, decided to allow passenger trains to pass on unspecialized track which was intended for the parking of locomotives and which, moreover, was in bad condition. As a result, four cars of the Tambov-Moscow express train No 31 were derailed because of the spreading of the gauge. Fortunately, people were not hurt.

Freight train wrecks occurred on the Central Asian—two (a collision and the passing of an inhibiting signal), the Belorussian (the fracturing of a railcar wheelset axle neck), the Baykal-Amur (the settlement of the roadbed), the Baltic (the throwing out of the track), and the Azerbaijan (running over at a crossing).

Based on the safety situation, the Central Asian is now one of the worst. Accidents on the Ashkhabad and Bukhara divisions were added in April to the two wrecks that were tolerated during the first quarter. Both are on the consciences of the locomotive workers. In general, the situation regarding safety in locomotive facilities has become extremely acute on the network. Eight wrecks were allowed during the first four months; of them, three involved passenger trains.

On the whole, the number of cases of waste in train and shunting work has been reduced by 11 percent in comparison with April of last year. It was also reduced for all facilities accept signaling, interlocking, blocking and communications. At the same time, the number of departures of unsecured rolling stock, crossing of inhibiting signals, fracturing of railcar wheelset axle necks, and collisions of rolling stock grew.

Things are bad with the insuring of traffic safety on subways. On 11 April, the sixth car's second bogie left the rails during a consist's travel without passengers to its night parking location on the Moscow Subway's Tagansko-Krasnopresnenskaya line. Normal movement of trains on the line was restored only after nine hours. The reason for the derailment was a violation of the clearance limits of the tunnel special equipment's threshold metal framework on which the wheelset's gear box caught.

The Traffic Safety Main Administration has examined the circumstances and the causes of the wrecks, accidents and other gross safety violations which were committed in April. A number of directors have been held strictly accountable for the failure to insure traffic safety and implement the decisions of the Ministry of Railways Collegium. Dubchenko, the Moscow Subway chief, was reprimanded for serious derelictions in his preventive work; and Fedorov, his deputy and the chief traffic safety inspector, was warned for his failure to completely comply with his official duties.

A regular session of the All-Union Commission on Road Traffic Safety was held on 17 April. Criticism addressed to the Ministry of Railways because of the increase in violations of Road Traffic Regulations by motor vehicle transport drivers in railroad enterprises was heard. The commission also examined questions on increasing driver accountability for violations when crossing railroad crossings.

*Based on material from the Ministry of Railways Traffic Safety Administration.*

### **Railroad Crossing Dangers Cited**

#### **Transport Conference Examines Problem**

904H0176A Moscow GUDOK in Russian 3 Apr 90 p 2

[Unattributed article: "A Zone of Special Attention"]

[Text] We have already talked under this headline about the alarming situation that has taken shape at railroad crossings.

Continuing this subject, we are publishing today material on a meeting that was held in the Ministry of Railways Traffic Safety Main Administration and on the all-union contest in which the USSR Ministry of Internal Affairs State Motor Vehicle Inspectorate Main Administration and Central Television participated.

The Ministry of Railways Traffic Safety Main Administration has analyzed the state of affairs in insuring traffic safety at railroad crossings. Last year, 263 people were killed and 349 injured in collisions between trains and motor vehicles. This exceeded the number of victims in other transport accidents almost tenfold.

The directors of the Lines and Signals, Communications and Computer Equipment main administrations; All-Union Scientific Research Institute of Railroad Transport scientists; representatives from the USSR Ministry of Internal Affairs State Motor Vehicle Inspectorate Main Administration, RSFSR Ministry of Motor Transport and RSFSR Ministry of Highways; and the service directors of the Moscow and Belorussian railroads, the RSFSR and Belorussian SSR State Motor Vehicle Inspectorate administrations and the Moscow and Smolensk oblasts' Internal Affairs Administration's State Motor Vehicle inspectorates participated in the conference.

In accordance with the decisions adopted, the Ministry of Railways has required the chiefs of the railroad divisions and track, signals and communications subdivisions to examine conditions for insuring traffic safety at each railroad crossing and to plan and implement necessary measures to bring the crossings into complete compliance with the requirements in the instructions for their lay-out and servicing. It was recommended that train movement speeds be reduced at certain crossings having a small amount of train traffic and a considerable volume of motor transport activity.

The chief engineers of the railroads and divisions must approve the plans for equipping crossings with automatic equipment in 1990 and insure their implementation.

It was suggested that the chiefs of the railroads and divisions intensify the work of the mobile safety posts which are being established based on Ministry of Railways instructions.

In coordination with the USSR Ministry of Internal Affairs State Motor Vehicle Inspectorate Main Administration, the Ministry of Railways proposes to certify—after the appropriate training—the assistant chiefs of track, signals and communications subdivisions as well as the better trained crossing attendants. After this, it is proposed to register them as part-time State Motor Vehicle Inspectorate inspectors. This must be done to observe legal validity when drawing up a protocol and for instituting administrative proceedings against violators of the Road Traffic Rules, who cause an accident at crossings because of this.

The Ministry of Railways has required track subdivision and station chiefs and armed security workers to busy themselves on a regular basis with explaining the rights that have been granted to the part-time State Motor Vehicle Inspectorate inspectors.



The statement of the Ministry of Railways Traffic Safety Main Administration about announcing a contest for the best technical device, which would prevent entry onto a railroad crossing when the gates are closed, was considered.

### Safety Contest Held

904H0176B Moscow GUDOK in Russian 3 Apr 90 p 2

[Unattributed article: "All-Union Contest"]

[Text] In order to further improve traffic safety operations and to design effective technical systems, which would eliminate travel through traffic light inhibiting signals and the colliding of trains with motor transport at Ministry of Railways crossings, an All-Union Contest is being conducted with the participation of the USSR Ministry of Internal Affairs State Motor Vehicle Inspectorate Main Administration and Central Television.

A total of 16,000 rubles has been allocated from Ministry of Railways reserves in order to award a prize to the winners. Fifty prizes of 100 rubles each have been established for the best photograph which shows a violation of Road Traffic Rules at railroad crossings. The photographs, which are submitted for the contest, will be shown on Central Television's program "120 Minutes."

The photos should depict an established actual violation of the Road Traffic Rules when the drivers of motor vehicles, agricultural machinery, tractors, and other self-propelled equipment are crossing railroad crossings. The photograph must show the crossing with its equipment, the approaches and the vehicle, which is violating the rules, and its state license plate.

Photographs that are 12 x 18 centimeters in size are to be submitted to the contest in two copies, both in color and in black and white, along with an explanatory note (typed) with a description of the area where the crossing is located and a brief description of the crossing (category, type of automatic equipment, approaches, lighting, approach visibility from the point of view of both the driver and the engineer, the presence of signals and highway signs, etc.). It is necessary to give the date of the violation; a detailed description; the last name, first name and patronymic of the violator; the type and model of the vehicle; and specific recommendations to improve train and motor vehicle traffic safety at this and other crossings. When several photographs are available, each of them is officially submitted individually.

The proposal materials are not signed by the authors but are sent under a motto. A sealed envelope, on the front side of which the participant's motto is indicated, must be attached to it. Inside is a sheet of paper with the motto; last name, first name and patronymic; place of work; and home address with the signature of the author (authors). If there are several participants, a sheet of paper pointing out the percent of participation by all authors and also signed by them should also be inserted in the envelope.

The material on technical innovations, which is to be submitted to the contest in two copies, should include: an explanatory note (typed) describing the device and the operating principle of the innovation and indicating the distinctive features and advantages over existing types. In addition, there should be sketches of the device in draft form that have been done in an arbitrary scale on size 11 Whatman paper sheets. Photographs, a model or a test sample of the device being suggested can be submitted.

Contest participants do not lose the right to receive an author's certificate for the invention or an innovator's certificate for the developed subject and the appropriate compensation in accordance with existing legislation.

The materials are sent by registered letter to the Ministry of Railways Traffic Safety Main Administration at the following address: 107174, Moscow, Novo-Basmanaya. Indicate "For the Contest" on the envelope.

The last date for submitting proposals is 25 December 1990. The date is determined from the post mark stamped when the material is sent.

Monetary prizes have been established for the best proposals: one first prize of 5,000 rubles, one second prize of 3,000 rubles, and three commendation prizes of 1,000 rubles each.

GUDOK will publish and Central Television will report the contest results.

### Rail Institute Official Opposes High-Speed Rail Line

904H0202A Moscow SOVETSKAYA ROSSIYA in Russian 11 May 90 Second Edition p 1

[Article by A. Poluektov, senior scientific associate, All-Union Scientific Research Institute of Railroad Transport: "The Next 'Project of the Century'?"]

[Text] Quite a few optimistic reports have appeared in the press about the plans to build a high-speed rail mainline from Leningrad to Moscow to the Crimea to the Caucasus. The speeds of the superexpress trains of the future which are being publicized are breathtaking. However, far from all specialists share the enthusiasm of their colleagues and journalists.

The depressingly poor work of the railroads is no surprise to us now. Traffic safety and regularity have declined and the speeds of passenger trains have decreased from the 1970's. Rails have to be replaced on 60,000 kilometers of track, 15 percent of the ties are completely worn out, and there are over 7,000 sections where trains are forced to limit their speeds. Vast sums are required to build and renovate stations, terminals, and structures for servicing trains, including washhouses for railcars and the like.

In a word, it is time to resolve the problems of safe and regular service for passengers without delay. People

cannot reconcile themselves to late trains, long ticket lines, and poor service both at the terminals and en route. However, the Ministry of Railways is not concerned about correcting the matter somehow. The impression is created that the ministry is perplexed by only one thing: proving to the Transport, Communications, and Information Science Commission of the USSR Supreme Soviet's Council of the Union and other authorities the urgency and necessity of building a high-speed rail line from Leningrad to Moscow to the South which they believe will solve all the passenger transportation problems.

The cost of this line was set at 10 billion rubles four years ago, but it is estimated at 18 billion today. Taking into account that it is planned to make use of military enterprises to carry out the project, it will climb even higher. It is planned to complete construction of "the mainline of the century" in the year 2020.

If we look at truth straight in the eye, our country is not prepared to undertake such construction. Research on high-speed traffic has been conducted in the VNIIZhT [All-Union Scientific Research Institute of Railroad Transport] for five years now, although thus far there are no completed studies on the rolling stock, tracks, power supply, the catenary system, communications, and so forth. Nothing is clear on the track maintenance questions, and the matter of the mainline's operation under winter conditions has not been studied.

The track is supposed to be laid on the ground and protected by a 2-meter reinforced concrete fence. It is not hard to imagine what it will cost us. No one is thinking about how this will affect the migration of animals and the economic activity of sovkhozes, kolkhozes, and other enterprises.

One of the most important questions—whether the Crimea and the Caucasus will be able to accommodate such a large contingent of vacationers and provide them with normal rest, and their food, transportation, and beaches—has not been studied. After all, the trains will be departing Moscow on this mainline every seven or eight minutes (120 pairs of trains per day).

The high-speed mainline is designed only for the operation of passenger trains; for this reason, the question of its use between peak periods, when passenger transportation is reduced by 30 to 40 percent, is appropriate. Moreover, it should not be forgotten that more spacious and economical aircraft are being developed for air transportation as well, you know...

The problem of how passengers on the high-speed line will get into the major cities has not been thought through adequately. The mainline will pass no closer than 30 to 45 kilometers from them, and this in turn will substantially increase passengers' time en route.

It is difficult to understand the persons who maintain that construction of the high-speed mainline has to be begun in the 13th Five-Year Plan. The problem is not

even that a plan has not been drafted, but its implementation is ill-timed. An extremely complicated economic situation has developed in the country.

Special attention should be devoted to suburban service to get passengers to work or school and back. The electric trains on suburban lines are obsolete, and no wonder—they have been in use since the 1950's. New designs for the ER-29 and ER-30 electric trains were developed about 15 years ago, but they have not made their appearance on the railroads thus far, and now their designs are already obsolete. Double-deck railcars are being used for suburban service in France, Japan and other countries. The question of their use here was examined at a scientific council of the USSR GKNT [State Committee for Science and Technology] back in 1983, but there is not even an engineering assignment for designing such railcars to date.

I see no point in recounting all of railroad transport's problems here—they are well-known both to the passengers and the managers of the Ministry of Railways. They are what the ministry should be concentrating its attention on today. As far as the high-speed railroad from Leningrad to Moscow to the South is concerned, its expensive construction has to be postponed until better times.

UDC 629.423.016.56

### High-Speed Rolling Stock Requirements Examined

904H0212A Moscow ELEKTRICHESKAYA I  
TEPLOVOZNAYA TYAGA in Russian No 5, May 90  
pp 5-8

[Article by Yu. N. Dymant, scientific associate, Riga Branch of the All-Union Scientific Research Institute of Railcar Building, and M. T. Glushkov, A. M. Berезovskiy, V. V. Novarro, and S. I. Sokolov, candidates of technical sciences: "Rolling Stock for the High-Speed Mainline"]

[Text] An expanded meeting of the MPS [Ministry of Railways] Collegium devoted to development of high-speed traffic in our country was held in February 1990. An important report was delivered at it by Ye. A. Sotnikov, general designer of the Center-South High-Speed Mainline Project (VSM) and deputy director of the VNIIZhT [All-Union Railroad Transport Scientific Research Institute].

The project was worked out by the VNIIZhT together with scientific research, educational, and planning and design organizations of the Ministry of Railways, Ministry of Heavy Machine Building, Ministry of the Electrical Equipment Industry and Instrument Making, Ministry of Transport Construction, Ministry of the Aviation Industry, Ministry of Civil Aviation, Goskompriroda [State Committee for Protection of the Environment], the AN SSSR [USSR Academy of Sciences], and the Moscow Soviet in conformity with the state scientific and technical

program "High-Speed Ecologically Clean Transport," adopted by the USSR Council of Ministers on 30 December 1988. Today the concept of a mainline has been developed; it provides for the construction of specialized high-speed routes to handle train traffic up to 350 kilometers per hour parallel to the most heavily traveled directions in the system.

Ecological questions are to be resolved from fundamentally new positions. It is planned to provide for continuous and circulating water supply at industrial enterprises on the mainline, thorough purification of surface water, the use of ecologically clean rolling stock, noise reduction to established levels, and other solutions.

The operating and technical parameters of domestic high-speed rolling stock, STsB [signals, centralization and blocking] and communications facilities, and the complex of technical equipment to control and ensure the safety of train traffic have been worked out.

The cost of building the mainline will be 13 billion rubles, and the rolling stock will cost five billion rubles. The primary 650-kilometer section from Leningrad to Moscow will require 2.1 billion rubles to build, and the rolling stock for this section will cost 930 million rubles.

At the same time, the collegium noted that because of inadequate financing and difficulties attracting development engineers from industry last year, research was not utilized to the full extent to develop a number of the high-speed train's basic assemblies, including trucks for a speed of 350 kilometers per hour, a traction transmission with body-support suspension for the traction engine, a double-level trailer railcar, new braking systems and automation and diagnostics units. The high-speed train's main manufacturing plant and the main organization for its development in industry were not determined.

Work also has to be intensified to develop highly stable track structures, a number of highly productive machines for construction and maintenance of the track and catenary system, and technical devices to protect the track from snow. Work must be expanded to develop special technical devices for the train traffic control systems, power supply, and communications facilities.

The collegium pointed out that development of the high-speed mainline is a national problem whose solution is aimed at fundamentally improving transportation service for the public in our country and it approved the plan for a Center-South Passenger Mainline.

The editorial staff of ELEKTRICHESKAYA I TEPLOVOZNAYA TYAGA has been publishing materials on the problem of developing high-speed traffic in our country. Thus the item "The High-Speed Route of the ER200" was published in issue No 3 for 1989 and the article "High-Speed Traffic: A Step Ahead?" appeared in No 10 for 1989. Today we draw our readers' attention to the next material on this subject, which gives an account of work by scientists at the Riga Branch of the All-Union Scientific Research Institute of Railcar Building.

The history of high-speed rail transport began in 1964 with the opening of the world's first line between Tokyo and Osaka, on which the trains reached speeds of up to 210 kilometers per hour. In France, the Paris-Toulouse line began operating three years later. The speed here reached 200 kilometers per hour. Considerable experience has been accumulated on high-speed rolling stock in the world's leading countries and the basic trends in its development have been determined. The conditions under which it can be competitive with other forms of high-speed transportation, chiefly with aircraft, have been identified as well.

The manufacture and widespread use of high-speed trains have become possible only on the basis of advanced scientific research work. This relates first of all to the development of a powerful miniature complex of electrical equipment and undercarriage with a wheel pair of minimum mass.

An alternating current drive using asynchronous traction engines and converter units based on modern power electronics formed the basis for developing such an electrical equipment complex. The last condition required introduction of new digital computer hardware into the system, which makes it possible to ensure high reliability of the entire complex of traction and auxiliary equipment.

Two ways of making up trains are in use today—the motorized railcar method and the electric locomotive method.

The motorized railcar version is an electric train consisting of five-, six-, and two-car traction sections. Its advantages include a large number of motorized axles distributed throughout the train. This makes it possible to provide an electric train with high traction force and maneuvering qualities when it is operating under conditions of limited route speed. The effectiveness of electrodynamic brakes are substantially increased because of the large number of braking axles.

Despite the fact that motorized railcars are somewhat heavier than trailer railcars, the loads from a wheel pair on the rails have been calculated as acceptable for high speeds. The consist of a high-speed electric train can be made up of a different number of two-car sections without essentially changing its traction indicators in the process. The failure of one motorized section in the consist has a negligible effect on the traction indicators.

The arrangement of a motorized railcar consist is formed as follows. The lead motorized railcar (GM), which has a control cab, two motorized trucks, and a frequency and voltage converter, is in front. It is coupled into a section with an intermediate motorized railcar (MPt) which has a current collector, transformer, rectifier, and one motorized truck. The following sections (except the one on the end) consist of a motorized intermediate car (MP), which has a frequency and voltage converter and two motorized trucks, and an MPt car. The consist may

be changed from 12 to four cars by leaving out a traction section (GM plus MPt) or the intermediate section (MP plus MPt).

This arrangement is used in Japan. Its main drawback is the dispersal of power in several complete units of electrical equipment, which leads to an increase in the overall mass of the electrical equipment and a large number of motorized trucks.

The electric locomotive version is a train consisting of two to four lead motorized cars (electric locomotives) and 10 to 14 intermediate trailer cars. All traction equipment in this case is concentrated only in the lead locomotive-cars; because of this, the mass of electrical equipment is reduced and there are less motorized trucks than with the motorized railcar arrangement.

The electric locomotive arrangement is as follows: there are two lead traction cars (GMT) in the front and the rear which have control cabs, a full set of electrical equipment, and two motorized trucks each. There are no passenger accommodations in the GMT. There are five or six passenger trailer railcars (P) between the lead cars. In order to increase capacity, two such consists are coupled together.

This is the version used in the FRG, France, Italy, Britain and Sweden. High-speed trains are used efficiently with electric locomotive traction only if special mainlines are used, if the trains do not run too frequently, and if speed restrictions are not frequent.

In any case, the final version of a train may be decided only on the basis of a comparative technical and economic analysis which covers all the factors related to the trains' construction and operation. There is no question about one thing: high-speed traffic has an important future.

A common European system for this form of transport, which has high priority for the many countries in Europe, was established recently. In the next 10 to 15 years, it is planned to develop high-speed mainlines linking England, France, Spain, Portugal, Belgium, the FRG, Switzerland, Italy and Austria. At present, there are about 150 high-speed trains in continuous operation in Europe and about 250 in Japan.

Development of the new form of transport began in our country. The first ER200 electric train, which reaches a speed of up to 200 kilometers per hour in certain sections, was put into continuous service on the Leningrad-Moscow route 6 years ago. In the forthcoming years it is planned to build several more trains of this type, which will make it possible to increase the number of runs on this line and to accumulate experience in operating the high-speed express trains much more rapidly.

At the same time, the question of developing the Center-South High-Speed Mainline (VSM) in the USSR has been raised. Its construction has been included among the 14 high-priority state programs for scientific and

technical development approved by the USSR Council of Ministers. Construction of the Leningrad-Moscow-Lozovaya VSM, with spur lines to Simferopol and Rostov, and from Rostov to Sochi and Mineralnyye Vody has been designed for high-volume passenger service.

Provision is being made for a speed of up to 300 kilometers per hour over the entire route from Leningrad to Rostov and Simferopol. Beyond the limits of the Rostov junction it will be reduced and selected on the basis of technical and economic calculations. There will be approximately 120 pairs of trains per day in the summer season. It is planned to dispatch trains in blocks (five to seven per block) with minimal intervals of six minutes between following trains.

An alternating-current 25-kilovolt power supply system on a commercial frequency of 50 hertz in the catenary system has been approved for the mainline. It is planned to route the line past Tula, Orel, Kurs, Belgorod, Kharkov, Zaporozhye, and other cities. For this reason, the electric trains should be operated on two types of current—25 kilovolts a.c. and 3 kilovolts d.c., since the railroad lines adjoining the cities are equipped with a direct-current system.

At the suggestion of the VNIIZhT, the Riga Branch of the All-Union Scientific Research Institute of Railcar Building has drafted a technical plan for the VSM-EPS1 (high-speed mainline - electric rolling stock 1) type of electric train for passenger service at 300 kilometers per hour in the Center-South direction. Taking into account the experience in operating the ER200 for a basis, the railcar's main dimensions will be: length 26 meters, wheelbase 18.8 meters, and cantilever 3.6 meters (See photograph on p 4 of ELEKTRICHESKAYA I TEPLVOVOZNAYA TYAGA No 3, 1990).

The all-metal body is to be of welded construction, made of durable aluminum alloys or alloy-treated steels. In order to increase the strength indicators and reduce labor-intensiveness in its manufacture, it is planned to use large-sized panels in its assembly, which will reduce the number of welded seams.

In view of the fact that the dimensions of the body sections have considerable influence on the air resistance (the magnitude of aerodynamic drag is proportionate to the area of a cross section and the speed squared), proper selection of a section for the car body and its dimensions is most important. A barrel-shaped cross section with maximum height of 3.84 meters from the railhead was suggested for further analysis.

Calculations have shown that incorporating the framework of the lower part of the body in the load-bearing structure (within which the under-car equipment will be arranged) makes it possible to reach the frequency of the first tone of flexural vibrations at no less than 10 hertz without increasing its mass. The vibration indicators of the body are thereby increased and vibration conditions are improved for passengers' comfort.

The body should be coated inside with a thick layer of an antinoise compound to dampen the chassis noise. The car's protective structures (the floor, walls, and ceiling) are to be of sufficient thickness to sharply reduce the transmission of outside noise within the car and allow for the installation of heat and sound insulation between the body and the outer casing.

The cars are designed for two sizes of rolling stock (T and 1T) in accordance with GOST [All-Union State Standard] 9238-83 and provide for all the necessary accommodations. The passenger area is separated from the employees' accommodations by tightly closed doors. Fire-resistant materials will be used in the outer casing, the roof, the walls and the floor. All facing materials should make it possible to wet-clean the car. The passenger accommodations will have seats with armrests to meet the improved comfort requirements.

The basic layout adopted for the electric train is 12 cars (two MG plus six MPt plus four MP). The consist is changed from 12 to four cars by excluding the appropriate number of traction sections. Three alternatives for making up the train have been analyzed. In the first version, the cars of a 12-car train are motorized. The consist has 48 traction engines, each rated at 350 kilowatts per hour. The second version provides for 50 percent of the axles to be motorized; 24 traction engines, each rated at 600 kilowatts, are positioned on them. In the third version, 75 percent of the axles are motorized in the consist. All the cars are motorized, but only the car with the current collector has one motorized truck. The second truck on the current collector side is a trailer, since a power transformer weighing about five tons is arranged on this side. Altogether, the train has 36 traction engines, each rated at 380 kilowatts.

The allowable load on a wheel pair axle assigned by technical requirements is 17 tons. In order to verify that this requirement can be met, the tare and gross weights of all three types of cars were calculated. It was established that the approximate mass of the tare for an MG car will be 60.15 tons, but taking the gross into account, the loading on the rail from a wheel pair axle will be 16.53 tons. The corresponding figures for an MP car are 56.56 and 16.6 tons, and for an MPt car, 57.42 and 16.83 tons.

To improve comfort, it is planned to have cars of two classes—I and II—in a consist. In MP and MPt Class I cars, where seats are positioned in a 2 plus 2 arrangement and the width of the car is 3.48 meters (size T), it is possible to accommodate seating for 64; in the Class II cars in a 2 plus 3 arrangement, there will be 99 seats. When size 1T is used and the car width is 3.08 meters, the number of seats is reduced—52 for Class I cars and 80 for Class II cars.

Drafts of a motorized truck have been sketched within the framework of the technical assignment as well. It will be two-axled with a rigid stamped and welded frame. The wheel pairs will have tubular axles and lightweight

seamless rolled wheels. Four pins have been pressed into the disk of one of them, to which the quill drive, which transmits the traction moment from the gearbox to the wheel pair, is attached.

In view of the fact that the traction engine block with the gearbox is partly suspended from the car frame, a coupling with linear compensation has been used. It is a tapered pipe positioned on one axle with irregularly shaped flanges (a disk with four claw-shaped pins). On the end with smaller diameter, the flange is removable. It is attached to the pipe by a splined edge joint.

Rubber-metal sleeves, which transmit the loads from the pipe end with the smaller diameter to the pins of the seamless rolled wheel, have been pressed into the lugs of the flange guides. On the side with the larger diameter, the guides are connected to a flange attached to a hollow shaft on the gearbox by a splined edge joint. The hollow shaft on the gearbox covers the coupling over the entire length of the wheel pair.

The truck's gearbox has cylindrical single-reduction gears with an idler gear. It is used because of the necessity of providing for ground clearance for the gearbox and working space between the hollow shaft and the engine housing. The sealed "gearbox-traction engine" unit has three suspension points. On the gearbox casing and on the bracket of the second support for the small shaft there are lugs to which this unit is suspended from the end beams of the truck frame. The third suspension point is a lug on the traction engine casing which is attached to the frame of the car body.

The vertical loading on the truck from the body is transmitted through the pneumatic springs of the central suspension. The truck's braking is a system of individual disk brakes. Three brake disks are mounted on the hollow shaft of the gearbox. Altogether there are six brake units on the truck.

The electric train is equipped with the following types of brakes: electrodynamic regenerative or rheostatic (EDT), activated by asynchronous traction engines operating in the generating mode; a mechanical disk friction brake (DT) with electropneumatic or pneumatic control; a linear-eddy current rail brake (LVT), which is not subjected to friction and wear and does not depend on the wheels' engagement with the rails; and a parking brake (RT), which prevents arbitrary movement when a consist is standing.

All cars of the electric train are equipped with these types of brakes. Auxiliary braking is provided by the combined action of the economical EDT and LVT types, which rule out friction and wear. The effectiveness of auxiliary braking is calculated from the conditions to reduce the train's speed from the maximum, 300 kilometers per hour, to an assigned route speed of 240 kilometers per hour. The average braking deceleration of a train at the assigned route speed should be 0.5 to 0.55 meters per second<sup>2</sup>, with a braking distance of 9,000 to 10,000 meters.

Emergency braking is provided by the combined action of the DT and LVT types. In this case, the average braking deceleration should be 1.05 to 1.1 meters per second<sup>2</sup>, with a braking distance of no more than 4,700 to 5,000 meters. The wheel pairs are protected from slippage by a unified antislip and antiskid device intended to eliminate excessive sliding of the wheel pairs both during traction and in all other forms of braking.

The technical requirements for the train's electrical equipment were worked out by the Riga Electrical Machine Building Plant Production Association. For the third version, it is planned to accommodate the following in the space underneath the car: asynchronous 380-kilowatt traction engines, modules with inverted rectifier converters (VIP) and self-contained current inverters (AIT), reactive power compensators (KRM), traction transformers of 25 kilovolts and 50 hertz, units with the VIP and AIT equipment, input filters, units of air-blast resistors and switches, FROS-400 and KROS-50 reactors, a high-voltage converter for auxiliary circuits, radio interference-suppressing chokes and arresters, a fast-response electronic circuit breaker, a storage battery, thyristor-impulse interrupters (TIP) and the units of equipment for them.

The rest of the equipment—equipment for auxiliary circuits, units to control the inverter and converters, and so forth—are arranged inside the car in end cabinets. This is where the control cabinets for the VIP and AIT; the heating, lighting, ventilation, and air conditioning units; and other instruments are located.

An automated control and diagnostics system based on computer networks is being developed to ensure improved operating efficiency and traffic safety. It covers all the processes related to the operation of equipment installed in the cars, it provides for communication between cars when operating under a multiple-unit system, it provides information to the engineer on equipment status and the parameters of routine processes in the systems, and gives information on the signals of automated track equipment controlling train traffic on the route.

The system automatically sets the limits applied by the automated track equipment signals, monitors the condition of braking equipment, and shifts to the emergency mode (emergency braking) when malfunctions are detected in the train itself or according to the automated

track signals; it also observes the condition of the engineer and takes immediate steps to stop the train if the engineer's lack of alertness is detected.

A multiple-processor system is used to cope with the tasks of controlling the train. The acquisition, processing, and transmission of data on the high-speed express are provided by a multipurpose microcomputer which is capable of performing complex traffic control tasks. The electric train is being equipped with a complete communication and data system which provides for radio communication between the dispatcher and the train engineer and the transmission of data on the parameters of traffic to the automated mainline control system. Radio communication also has been provided between the train chief and the engineer and telephone communication has been provided between the conductors and the train chief.

The on-board system of technical diagnostics consists of microprocessor controllers for the train's diagnostics, mechanical and braking systems, traction and auxiliary electrical equipment, and control systems. In the event that conditions arise which threaten traffic safety, the computer informs the locomotive brigade and makes adjustments to the traffic process as necessary. The on-board diagnostics system transmits data both to the engineer's console and the traffic control center either immediately or by recording for submission after the run.

So the draft of the technical assignment for a high-speed motorized electric train for the Center-South Mainline provides for development of a "deluxe" train on this basis with the most passenger comfort. The cars should be equipped with an air conditioning system, a powerful ventilation and heating system, fluorescent lighting, comfortable passenger seats, reliable protection from noise and vibration, a passenger information system using an electronic panel, a multiple-program broadcast and video installation, radiotelephone service between a passenger and a subscriber outside the train, a reservation and seat assignment system for passengers to order tickets from the train, and much more.

In comparing the indicators proposed in the draft of the technical assignment for the VMS-EPS1 electric train with trains in the FRG, France, and Japan, it is worth mentioning that the electric train is not inferior to the advanced technical level of foreign high-speed trains in a number of basic technical and economic indicators, such as the number of passenger seats, the mass of the tare per passenger, the mass of the tare per meter of length, the specific power of the train, and the power per passenger.

Comparative Indicators for Electric Trains

Name of Indicator, Unit of Measurement	Proposed Versions of the VSM-EPS1			ICE, the FRG, 1989	TGV-A, France, 1988	Series 200, Japan, 1983
	100-Percent Motorized Axles	75-Percent Motorized Axles	50-Percent Motorized Axles			
Structural speed, in kilometers per hour	350	350	350	250 (rated at 350)	300	260
Train composition	2MG + 6MP <sub>t</sub> + 4MP			2MG + 14P	2MG + 10P	2MG + 10MP
Length of train, in meters	319.40	319.40	319.40	382.38	240.0	300
Length of cars, in meters	26	26	26	20.8/24.3	MG: 22.15, P: 21.8, P: 18.7	24.5
Width of cars, in meters	3.48	3.48	3.48	3.02	2.904	3.38
Mass of cars' tare, in tons	MG: 55.16, MP <sub>t</sub> : 59.4, MP: 52.5	MG: 60.15, MP <sub>t</sub> : 57.4, MP: 56.5	MG: 57.2, MP <sub>t</sub> : 55.8, MP: 54.6	79.8/45	68/32.4	62.7
Mass of train's tare, in tons	667.13	673	668.18	789.6	500	756
Number of seats on train	1,118	1,118	1,118	600	485	885
Mass of tare per passenger, in tons	0.597	0.601	0.598	1.3	1.03	0.95
Power of traction engines, in kilowatts	15,630	13,680	15,600	8,400	8,800	11,040
Specific power of train, in kilowatts per ton	23.02	20.3	23.3	10.6	17.6	13.12
Power per passenger, in kilowatts	14	12.24	13.95	14	18.14	12.5
Gross weight of train, in tons	789	803.5	780	849.6	548.5	816
Mass of tare per meter of train length, in tons	2.08	2.1	2.09	2.06	2.08	2.52
Loading per axle, in kilonewtons	170	168	164	200/120	170/98	170

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### Track Maintenance Problem Areas Highlighted

904H0197A Moscow PUT I PUTEVOYE

KHOZYAYSTVO in Russian No 4, Apr 90 pp 2-4

[Article by N.P. Kemezh, deputy chief of the Lines Main Administration of the Ministry of Railways: "Use Reserves To Increase the Reliability of the Line"]

[Text] The season of summer track work has come. Given the difficulties that have formed with material-technical resources and personnel for routine maintenance of the rails, the Lines Main Administration is devoting particular attention to making its capital more sound. Therefore, when the plans for the roads were shaped, almost all the new materials for the permanent

way were allocated for capital repair, with the intention of using old elements for other types of repair and routine track maintenance.

The results of last year's work are quite distressing: the tasks were not fulfilled for one single type of repair. Capital repair was 93.7 percent accomplished, intermediate maintenance—99.6 percent and track raising—95.7 percent. In capital repair, 4,920 km of new grids with reinforced concrete ties were laid instead of 5,077 km (96.9 percent), and 4913 km of strings, when there should have been 5,081 km (96.7 percent). Particularly bad, however, is the lack of full volume fulfillment of capital repair on the most important passenger and heaviest freight routes because of unsatisfactory work organization, lack of provision for "windows" and scattering of resources. Let us say, on the Moscow-Leningrad section, with the plan being 168 km, 136.5 km were



accomplished, on the Kharkov-Lozovaya, respectively 74 and 48 km, Rostov-Mineralnyye Vody—197 and 109 km, Valuyki-Rtishchevo—242 and 229 km, and Isil-Kul-Bolotnaya—265 and 155.7 km.

When approaching the matter objectively, it must be noted that most of the roads suffered from late delivery of permanent way materials. As a whole, the enterprises of the USSR Ministry of Metallurgy undersupplied the track workers by 590 km of rails, 594 tons of fish-plates, chair plates and rail clips, 506 tons of bolts, 1,241 tons of wood screws and 899 tons of fasteners for the reinforced concrete ties. Even with this, however, some roads have been slow to transport the materials allotted. For a considerable time, already finished products were found at the Kuznets Combine, since the flatcars for rails on the Central Asian, West Kazakhstan, Alma-Ata, Tselina and South Urals roads were delayed. The Sverdlovsk Road dispatched cars to the Nezhnesaldinsk Plant for fasteners, the Donetsk Road—to the Druzhkovo Hardware Plant, and the West Siberian—to the Novosibirsk Switch Plant in an uneven flow.

Things went particularly badly last year with respect to wooden ties: with the plan for 20 million pieces, the track workers actually received 14.5 million. The supply of switch ties was even worse (only 50 percent) and only 37.8 percent of the bridge beams were obtained. Unfortunately, many roads have failed to adopt exhaustive measures to put into effect the resources allotted for wooden ties, switch ties and bridge beams. As a result, for example, on the Lvov Road, only 54 percent of the wooden tie resources were utilized, on the Southern—43.6 percent, Azerbaijan—44.5 percent, Transcaucasus—54 percent, West Kazakhstan—59 percent, Alma-Ata—57.3 percent. The list could be continued. Only two roads—the Volga and the East Siberian—fully utilized all the wooden ties.

The poor provision of wooden ties and beams was exacerbated even more by the fact that the roads that ship them, particularly the Krasnoyarsk and Sverdlovsk, have not promptly picked up the output from the enterprises of the USSR Ministry of the Timber Industry and Ministry of Foreign Affairs. The Lines Main Administration and the roads, in order to reduce the shortage, have taken measures to increase the supply of wooden ties of group II.

Only nine roads—the Lvov, Dnepr, Volga, Central Asian, Kemerovo, Krasnoyarsk, East Siberian, Transbaykal and Far Eastern—have proved to be up to all types of repair. The West Siberian, which managed only 66.2 percent of the plan for capital repair (186 km behind), and simply made a mess of the intermediate maintenance and track raising plans, did not come up to expectations. The Southwestern, North Caucasus and Azerbaijan roads did not fulfill the assignment for a single type of repair. The track workers of the Sverdlovsk Road did not master intermediate maintenance, and the Northern, Transcaucasus and North Kazakhstan—track raising. Although they had sufficient wooden ties, the

Moscow, Northern, North Caucasus, Transcaucasus, Southeastern, West Kazakhstan and Alma-Ata roads did not cope with major work on making the tracks sound. All of this indicates that the roads have not yet learned to make efficient use of resources, which, with the acute shortage of materials, is completely unforgivable.

At the same time, the Transbaykal, East Siberian, Krasnoyarsk, Sverdlovsk, Tselina and Kuybyshev roads used both new ties and old ones sensibly, in all types of repair and routine maintenance.

Capital repair of tracks with reinforced concrete ties was strained last year because of the uneven and inadequate supply of fasteners. Nevertheless, the October, Belorussian, Gorkiy, Southern, Dnepr, Donetsk, Kuybyshev, Volga and South Urals roads did not just sit with their hands folded under these conditions. They managed to find reserves, and, by using old fasteners, did a full volume of capital repair. And here the Baltic, Southwestern, Odessa, North Caucasus and West Kazakhstan roads, which had a full reserve of new fasteners, failed to cope with the assignment.

Things were bad last year with respect to ballast materials. The Lvov, Odessa, Southern, Dnepr, South Urals and East Siberian roads completely exhausted their own resources of crushed rock. No kind words on this subject can be said about the Baltic, Azerbaijan, Transcaucasus, Southwestern and West Kazakhstan roads. Incidentally, roads such as the Moscow, Gorkiy, Northern and South-eastern suffered from a poor quality of crushed rock.

Unfortunately, many roads do not have their own quarries, and therefore the main administration specifies assignments for supplies. Throughout all of last year, the Lvov Road did an extremely unsatisfactory job of shipping crushed rock to the Baltic Road, since the hopper-batcher consists sent by the Lvov Road were unjustifiably delayed en route, and sometimes part of the ballast was arbitrarily taken for its own needs. The supply of crushed rock from the Donetsk to the Moscow and Volga roads was poor, since the plants of the Donetsk did not turn it out in accordance with the established assignment because of the fact that for two months, for technical reasons, the Orlovo-Slobodskoy Crushed Rock Plant lay idle and the Lomovatskiy plant was not in operation. It was futile to hope to receive crushed rock in full volume at the Moscow Road from the Odessa and at the Volga Road from the South Urals, again because of the unsatisfactory turnaround of the hopper-batcher consists. The West Kazakhstan and Kuybyshev roads through their own fault failed to remove crushed rock from the South Urals mainline.

Poor management of the unloading and movement of hopper-batcher consists led to their turnover through the network being 5.51 days, with a norm of 4.28 days. The Volga Road (turnover 16 days), the Kuybyshev (10.46) and the Moscow Road (9.79 days) particularly "distinguished themselves".

To transport ballast materials in the necessary volume and to create a crushed rock storage base on the roads, the main administration yearly redistributes hopper-batcher consists among the roads in the winter. The dividing up, it goes without saying, is not random, but according to the results of a thorough analysis. Some roads, however, as they say, disregarded the law. The Moscow Road did not receive the necessary number of hopper-batchers from the Donetsk, the Moldavian from the Southwestern nor the Southeastern from the Northern Caucasus.

Heavy machinery was best utilized on the Belorussian, Dnepr and Far Eastern roads, where the equipment was fully loaded. The October, Northern, Southwestern, Lvov, Volga, Kuybyshev, West Kazakhstan and Alma-Ata roads, however, did not fulfill the assignment for a single type of machinery. The output per set of track-laying cranes was 50-70 km, with the network average being 81 km. Cranes did not operate at full strength on the Baltic, Moscow, Northern, Transcaucasus, West Kazakhstan, Tselina, Alma-Ata and West Siberian roads.

On the whole for the network, the ballast layer on the main track was contaminated above the permissible limit on 20 percent of the length. The October, Baltic, Gorkiy, Northern, Odessa, Volga, Tselina, Alma-Ata, Central Asian, South Urals and West Siberian roads, however, used hardly any ShchOM [ballast reclaiming machines] and BMS [fine brown coal] in rebuilding the ballast.

The October, Moscow, Moldavian, Volga and West Kazakhstan roads fulfilled the assignments for track raising with electric ballasters by approximately 20-50 percent. Track realigning machines stood idle on the October, Southwestern, Lvov, Moldavian, Odessa, Azerbaijan, Volga, Kuybyshev and Alma-Ata roads. Over half of the roads failed to fulfill the plan for surfacing track with VPO-3000 machines.

Some 14 roads failed to achieve the established output per hour of "window". On the whole for the network it was 318.1 m (with the assignment 324.1 m, or 98.1 percent) and that was due to the PMS [track machine station] collectives of the East Siberian, Krasnoyarsk, West Siberian, Sverdlovsk and Kuybyshev roads, which had the highest results. The Baykal-Amur, Transbaykal, Alma-Ata, West Kazakhstan, Volga, Southeastern, North Caucasus, Southern, Lvov and Moscow roads, however, did not make the established output of 15-43 m.

It should be noted that last year the conditions for the "windows" allowed for track repair were adhered to more precisely. The number of holdovers, as compared with the preceding season, was reduced by 137. About 30 percent of them occurred due to breakdowns of the track machines and mechanisms, which attests to the low level of equipment preparation and specialist training. Derailment of rolling stock due to violation of the work

technology has inflicted large losses. A considerable number of "windows" have been held over because of unsatisfactory organization of repair and lack of coordination in the actions of the track workers and the workers in participating services.

The "windows" on the October, Odessa, Southern, Transcaucasus, Volga, Central Asian and Kemerovo roads went particularly unsuccessfully, and therefore, instead of the speed of 60 km/hr specified by the technological process, in many cases a limit of up to 40, 25 and even 15 km/hr had to be established. In all, after work in a "window", 3,023 speed limits below 60 km/hr had to be introduced (or 39 percent of the total number of "windows"), including 9—to 15 km/hr, 151—to 25 km/hr, and 2,863—to 40 km/hr.

The plan for shipping old rails to the national economy was fulfilled by 73 percent, specifically, by the Transcaucasus Road by 36 percent, the Azerbaijan by 47.4 percent, the West Caucasus by 49.2 percent and the Baltic by 49.4 percent. Only the October, Alma-Ata, Sverdlovsk, Kemerovo and Transbaykal kept their word.

We seem especially to be creating difficulties for ourselves, in order to overcome them later. The supply of old rails from road to road is very bad. Only the Donetsk mainline considered it a matter of honor to ship everything completely in accordance with its obligations. On the whole for the network, the plan was only 59.1 percent fulfilled. The Moscow shipped only 3 km instead of 50 km, the South Urals respectively 18.2 and 50, the West Siberian—7.6 and 20, and the Southeastern—43.5 and 75 km. For this reason, the replacement of rails with old ones broke down on the Baltic, Lvov, Azerbaijan and Central Asian roads.

The task of laying old grid with reinforced concrete ties was 87.2 percent realized. The October, Northern, Lvov, Southeastern, Volga, South Urals and a number of other roads were therefore in no hurry to make the track sound. True, the remnants of old grid with reinforced concrete ties are being reduced from year to year at the PMS bases and on the permanent-way districts. The Belorussian, Moscow, Southern, Odessa and Donetsk roads are already sorting out all the panels removed and are laying them again on low-activity lines, station and access tracks. Moreover, these mainlines are constantly asking to have this sort of grid sent on the sly from other roads. At the same time, the Southeastern, October, Northern, Volga and West Kazakhstan roads have accumulated over 720 km or 66 percent of the total available old grids with reinforced concrete ties. Unfortunately, the Volga, October and West Kazakhstan roads do not always sort out the grid and cut off the ends of the rails, because of which the station tracks, after they have been laid for a long time, are closed to train traffic.

Given the extremely critical shortage of new wooden ties, it is extremely important to repair and reuse the old ones removed during capital repair. In the last two years their repair volume has noticeably decreased. Even with

the availability of well equipped tie repair shops, a number of roads are using their capacities unsatisfactorily. On the whole for the network, only 42.7 percent of the old ties are relaid on a line: on the October Road—only 11.4 percent, the Azerbaijan—14.1 percent, the Baltic—17.9 percent, and on the Moscow, North Caucasus and Southwestern—21.8 percent each.

One of the most important conditions for reinforcing PMS is solving the social-everyday problems. The program of constructing and introducing housing, determined by order No 40Ts, on the whole for the network broke down in the period from 1985 to 1989. Some 583,800 square meters of housing were slated to be built for PMS workers, but only 341,900 have been built. The track workers of the Southeastern, Gorkiy, Northern, October, Moscow, Southwestern and Odessa roads, where only 20-40 percent of the housing has been obtained, are dissatisfied. One must also take into consideration the fact that the track machine stations are the only enterprises of their type where the workers are living in railway cars. There are now about 4,700 of these families. They include over 6,000 adults and 5,000 children. Some 2,500 single workers take shelter in these "little houses on wheels." The "car kingdom" is flourishing on the Northern, Kuybyshev, Gorkiy, South Urals, Southeastern, Dnepr, Odessa, Sverdlovsk, Belorussian, Southern, Southwestern, Moscow and October roads. Therefore, acute social conflicts often arise in the collectives there, which gives rise to a mass of complaints to Soviet and party organs. At the same time, on the West Kazakhstan, Tselina and Alma-Ata mainlines, housing is being purposefully constructed and people are being resettled from the cars to the new apartment houses.

The plan for rail welding has been fulfilled on the whole for the network due to the efforts of the collectives of the Belorussian, Southwestern, Donetsk and Sverdlovsk roads. The RSP-6 of the Donetsk, RSP-9 of the Baltic, RSP-5 of the Southwestern, RSP-15 of the South Urals and RSP-7 of the Krasnoyarsk roads have shown themselves to best advantage. The RSP-2 of the Volga, RSP-20 and RSP-36 of the Kuybyshev, RSP-27 and RSP-35 of the Southeastern, RSP-44 of the Alma-Ata and RSP-29 of the Kemerovo roads have regularly failed to cope with the assignments.

The road network has 41 RSP with 81 flow lines, which mainly provide for the demands for welding new rails both for jointless track and for panel track-laying. The volume of welding old rails, which was 2,608 km last year, is clearly inadequate. Because of the fact that the RSP do not supply rails in the necessary quantity, the industrial equipment was not loaded to full capacity on the Baltic, Northern, Southern, North Caucasus, Volga, Kuybyshev, Central Asian and Kemerovo roads, and the two flow lines were not brought to planned capacity at RSP-44 of the Alma-Ata Road for a year after it had been turned over for operation.

High-quality repair work is one of the most important reserves for increasing the reliability of the line. Last year, on the whole for the network, 48 percent of the repaired kilometers were turned over for permanent operation with an evaluation of "excellent" (Belorussian, Dnepr, Baykal-Amur, October, Lvov, Odessa, Kemerovo, Transbaykal, Donetsk, Southeastern and Krasnoyarsk). The indicators were spoiled a bit on the Transcaucasus, Moscow, North Caucasus and Kuybyshev roads, where some kilometers, after repair, were given only a "satisfactory" evaluation.

Serious violations of track repair technology, cases of record falsification in the evaluation of its state, and underfulfillment of the requirements set forth in MPS order No 10TsZ of 19 February 1985 were discovered in checking on the October, Volga, Krasnoyarsk, Alma-Ata, Transcaucasus and a number of other roads. For example, on km 188-195 of the Maksatikha-Malyshevo line of the Bologoye Division of the October Road, a large amount of substandard work and gross deviations from the maintenance norms were discovered; according to the readings of the car track measuring device, the evaluation was 12,000 points. Warnings of a speed restriction to 40 km/hr have been in operation since 1986 on the km 206-215 section Yershovsk-Pugachevsk on the Volga Road because of the unsatisfactory state of the track.

On some roads, because of the poor quality of restoring old-stock rails at the RSP, warning of a speed restriction to 40 km/hr must be installed after a jointless track has been repaired.

The Krasnoyarsk, Alma-Ata, Moscow, Transcaucasus and a number of other roads obviously overstate the evaluations when turning over kilometers for permanent operation. For example, on the Bugach-Minino line of the Krasnoyarsk road, the state of the primary main track at km 4082, 4084 and 4086 was evaluated on the acceptance statement as "good", but on the last passage of the track-measuring car, the state there was only satisfactory. The situation is the same on km 4277 of the Zaozernaya-Kamala line for the secondary main track. The Tyulkubas-Ostanovochnyy line of the Alma-Ata Road has the same shortcomings on km 3380, 3385 and 3388.

A wanton system has begun, on all roads where repair is being done to lower the level of the rail heads, of piling up the ballast in ditches, and leaving it at the track sides and slopes of the embankments and cuts, which makes it difficult to drain the water from the main area of the subgrade.

Often, during capital repair of the track, the crossings are not repaired, no kilometer reserve is laid out, and old materials are not removed. When assembling a grid with wooden ties, no openings are drilled before driving in the spike and no rubber separators are laid under the rail pad, which sharply reduces the service life of the ties. The weeds are not always cleaned from the crushed rock,

and this inevitably leads to track pumping immediately after repair. In capital repair of station tracks, the switch assemblies and connecting tracks in the station hump yards are not always replaced, as specified in the plan, which sometimes leads to prolonged warnings on speed restriction.

After repair, the kilometers are often turned over for permanent operation to commissions which do not include road foremen and brigade leaders of the permanent way districts. The directors of the track services of the October, Central Asian, West Kazakhstan, Odessa, Moscow, Gorkiy and Southwestern roads do not always take part in the work of these commissions.

The chiefs of the line departments or divisions of the Moscow, Moldavian, Odessa, West Kazakhstan, Transbaykal and Baykal-Amur roads do not always personally attend the acceptance of the repaired kilometers. On all the roads checked, acceptance is made once a month instead of twice a month, as stipulated by order No 10TsZ.

Despite the negative phenomena obscuring the general impression of the track service, the creative thought of production innovators and enthusiasts concerning their work has not been extinguished on the line. Last year marked a purposeful improvement in the methods and forms of organizing technology of all types to make the rails sound. The heavy-traffic sections have been singled out as most important and the track has been repaired in compressed periods with maximum concentration of resources and equipment. Some 70 percent of the work was done in combined "windows", and tasks requiring individual "windows" (replacing bridges, renewing the contact-wire system, STsB [signalization, centralization and blocking], etc.) were also performed. On the Donetsk, Southwestern and other roads, capital repair of the track was practiced on a single line, using two sets of track-laying cranes and heavy machinery.

The October Road introduced technology for capital repair of track, laying nonwoven fabrics. On the Moscow-Leningrad route, 23 km of track were made sound by this method, and on the Leningrad-Volkhovstroy—22 km. The Sverdlovsk, East Siberian, Transbaykal, Kuybyshev, Dnepr and Southwestern mainlines continued to improve the technological processes for capital repair. When laying panels with wooden ties, the output there reached 800 m, and with reinforced concrete ties—400 m.

On sections of jointless track, all the roads have developed a technology for laying strings in the required temperature range regardless of the atmospheric temperature, by means of engineer Zubov's heating units.

The Odessa, Southwestern, Dnepr and Donetsk mainlines have successfully incorporated rotary excavators into the technological chain when cutting the ballast body, which made it possible to increase the output in the "window" on sections where repair was done, while maintaining or lowering the levels of the longitudinal

profile. The Southwestern and Dnepr improved the quality of ballast cleaning and reduced the consumption of new crushed rock on sections where ShchOM-MF passed through. The October, Southwestern and Donetsk roads increased the quality of ballast cleaning and the output in the "window" during capital repair due to ShchOM-4M, and reduced the consumption of new ballast through returning cleaned ballast to the track. The Dnepr and Moscow roads, in finishing the track, successfully used machines developed by inventors Feldman and Ishchenko.

The Southwestern road organized the assembly of panels with reinforced concrete ties on a mechanized flow line, installed in an enclosed shop. The South Urals, West Siberian and Sverdlovsk roads, with large volumes of track in a "window" and without the required number of flatcars, used the method of transferring the flatcars of the track-laying train to a dismantling one, using an adjacent track. The October Road cleaned the weeds from the ballast with a ShchOM-ZU at the switch assemblies, at the sites of obstacles and on equalizing sections.

Surprising, against the background of the daring deeds of the leading collectives of the roads mentioned, are the Northern, Azerbaijan, Transcaucasus, Volga, West Kazakhstan and Alma-Ata roads, which are using the machine park inefficiently and are not striving to develop advanced technology and forms of labor organization more rapidly.

In 1990 an even more stepped-up plan was formed for making the line sound, particularly with respect to capital repair. Therefore it was necessary to take everything into consideration in the preparation, in order to avoid repeating the omissions of the preceding season. A check had to be made as to whether the personnel in various occupations had been recruited correctly, whether the proper social-everyday living conditions had been created at the sites for summer allocation of the track worker columns, whether the workers were delivered promptly to the work place and back again, and whether the preparation of the equipment, mechanisms, power equipment, hoisting-transporting devices and rolling stock was of a high quality.

The directors of the Baltic, Moscow, Moldavia, Southeastern, Volga and Kuybyshev roads, for which an insufficient quantity of ballast has been reserved, should increase their responsibility. The October, Gorkiy, Odessa, Southern, North Caucasus, Kuybyshev, West Siberian and Krasnoyarsk roads were obliged to make up for the time lost when they failed to fulfill the calendar plan for assembling grid with wooden ties, and the Moscow, October, Baltic, Gorkiy, Kuybyshev, Alma-Ata, Sverdlovsk and South Urals—with reinforced concrete ties.

Supplies of new materials for the permanent way of the tracks will hardly improve this year. We should not count on a full-volume supply of new wooden ties nor

smooth-flowing arrival of fasteners for the reinforced concrete ties. Therefore, the line service chiefs should take efficient measures when difficulties arise in utilizing the funds allotted for the permanent way, when necessary sending their representatives to the supplying plants. The roads must establish an extremely strict procedure for selecting, sorting and restoring old materials, in order to make up for the shortage of new.

All this taken together will make it possible, under the difficult conditions that have formed, to cope with the assignment and raise the reliability of the line.

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### Track Maintenance Support Program Reviewed

904H0197B Moscow PUT I PUTEVOYE  
KHOZYAYSTVO in Russian No 4, Apr 90 pp 19-20

[Article by V.N. Dyakonov and O.S. Skvortsov: "The 'Transport' Program. How Is it Being Fulfilled?"]

[Text] The All-Union Scientific-Technical "Transport" Program, is "To Create and Develop in Operation Highly Efficient Technical Devices and Technological Processes in Railroad Transport."

**Assignment: Introduce technology for the production of rails made of steel, killed and inoculated by new types of complex ferroalloys.**

**The Azovstal Combine.** Hard-faced rails from a TVCh heater, class I, group I (GOST 24182-80), the steel of which is killed by a silicon-magnesium-titanium hardener (KMT), have been certified for the highest quality category. Industrial output of hard-faced rails of group I, made of steel killed in a ladle by KMT with rare-earth metals (RZM) has begun.

The VNIIZhT [All Union Scientific Research Institute of Railroad Transport], with the Azovstal Combine and Yuzhmetallurg GPO, has done the following work. An evaluation has been given of the quality, reliability and operational life, and technical-economic efficiency of industrial lots of hard-faced rails of group I, the steel of which was killed in a ladle with a KMT hardener, and rails of group II, made of steel finished in a ladle by synthetic slag. The rails were tested on an experimental ring

At the end of 1988, the Azovstal Combine supplied the experimental ring of VNIIZhT with two experimental-industrial lots of hard-faced rails. The steel for them was finished in a ladle with synthetic slag and argon and was killed by KMT with RZM. At the same time, the steel of one lot was poured into ingot molds from above (code A113-1), and of the other—was poured with a siphon (code A113-2).

At the beginning of 1988, to accelerate polygon tests, a test lot of rails (code A113-1) was laid in the ring. After over 200 million tons of freight, gross, had been put through, the rails had not broken down.

The remaining rails (codes A113-1 and A113-2) were laid haphazardly with the experimental-industrial rails of other combines in September-October of last year.

**Kuznetskiy Combine.** Certified for the highest quality category in 1988-1989 were:

Full-hardened rails of class I, group I, the steel of which is killed in a ladle with the complex alloy FVdKs (KVdK), containing silicon, vanadium and calcium; the output volume is about 250,000 tons a year;

Rails made of steel killed in a ladle with silicovanadium KZF with nitrated silicovanadium or silicovanadium of the Tula NPO, as well as with calcium-silicon (output volume 500,000 and more tons a year);

Rails of group II: steel killed in a ladle with silicon-manganese-aluminum alloy and finished with a high-quality synthetic alloy, due to which the length of the alumina line does not exceed 4 mm (with the GOST 24182-80 norm up to 8 mm).

KMK [Kuznetskiy Metallurgical Combine], in accordance with an economic contract with VNIIZhT, placed two test lots of rails on the experimental ring. In one lot the steel was killed in a ladle with enriched silicovanadium KFZ and calcium silicon (code K76), and in the other—in a ladle with enriched silicovanadium KZF and silicobarium.

**Nizhne-Tagil'skiy Combine.** A great many complaints have come in, particularly from RSP, concerning the poor quality of the full-hardened rails of group I (steel killed with an alloy of FSKTsr, containing calcium, silicon and zirconium).

Because of this, the rails were certified for a higher quality category for a limited period. In accordance with a suggestion of the Lines Main Administration of the Ministry of Railways, NTMK is manufacturing "vanadium rails" (in the amount of 30% of the total number of rails). These are experimental-industrial rails, the steel of which is finished in a furnace with liquid vanadium iron and in a ladle with calcium silicon. They are more reliable than rails made of steel killed with an FSKTsr alloy.

Mass production has begun of rails, the steel of which is killed in a ladle with ferrous or silicovanadium with calcium-silicon.

**Dneprodzerzhinsk Combine.** The Ministry of Railways is using a limited quantity of DMK-produced rails, type R50, 12.5 m long, mainly for switch assemblies (about 60,000-70,000 tons a year) and they have not been certified by the ministry as a consumer, since this type of rails cannot be evaluated on the experimental ring under an increased axle load of 27 ton-force.

**Assignment: Develop and introduce technology for rolling rails at the KMK, using an all-purpose type of stand.**

## TRANSPORTATION

As early as 1986, the Uralmash PO was to supply KMK with all-purpose stands with auxiliary equipment. This assignment was not fulfilled, however. KMK adapted a stand of the Serovskiy Metallurgical Combine and is perfecting the grooving of the rolls and the technology for rolling the rails. The Uralmash PO was given the assignment of drawing up a technical plan for the manufacture of finishing, intermediate and prefinishing all-purpose stands.

In accordance with a contract with KMK, VNIIZhT is manufacturing a bogie to monitor the straightness of the center of the rails at the combine's stands, recording localized roughness on the rolling surface. KMK, with the participation of VNIIZhT and UralNIChM [Ural Scientific Research Institute of Ferrous Metals], is studying the reasons for the formation of localized roughness during rail manufacture.

**Assignment: Develop and introduce nondestructive quality control of rails at metallurgical plants.**

The KMK is operating a unit for ultrasonic monitoring of railheads over an entire cross section. Its startup is also being completed at the Azovstal Combine.

Units are being introduced for eddy-current monitoring of the surface of the rail head and foot at KMK and NTMK. This control will be set up at the Azovstal Combine during rail production.

**Assignment: Develop and introduce, at a new DMK [Dneprodzerzhinsk Metallurgical Combine] shop, the technology to produce thermostable rails, types R65 and R75, made of oxygen-converter degassed steel, poured in machines for continuous casting of blanks and rolled on all-purpose finishing stands.**

In accordance with the decision of the directive organs, the output of these rails is planned at KMK. Construction of the rail-rolling shop at DMK has been carried over to the 13th Five-Year Plan.

**Assignment: Develop the production of higher quality spring rail fasteners, type D-4u and BPU, as well as fish-plates with a special shape for glue-bolt joints.**

Fasteners of the KB type for reinforced concrete ties and spike type for wooden ties have ceased to satisfy operational demands. A KB fastener does not ensure stability in pressing the rails to the base. Because of the considerable failure rate of the parts of a fastener and the complexity of replacing them during capital repair of the track, the old rodding had to be removed. The advantages of jointless track and reinforced concrete ties have not been fully realized.

Sections with spike fastening create accidents, particularly in winter, because of the pressing of weeds and snow between the foot of the rails and the chair plate.

These circumstances hold back the throughput of heavy trains. In addition, with spike fastening, jointless track cannot be used.

Recommended for series production according to the results of operational tests of experimental-industrial lots, were: BPU fasteners for reinforced concrete ties and D-4u for wooden.

The use of laminated spring rail clips in BPU fasteners ensures stable mounting pressure of the rails to the base. As a result, the stability of a jointless track and the durability of the depreciating and insulating elements is substantially increased, and expenditures for repair and routine maintenance are reduced. Capital repair can be made on the track without removing the reinforced concrete ties. Up to 13 tons of metal per kilometer are saved, as compared with the KB fastener.

All of this makes it possible to save over 3,000 rubles/km a year. In the planned all-union scientific-technical program output volume, this is already over 3 million rubles a year, and with full replacement of the KB fasteners—over 15 million rubles.

The D-4u fastener makes it possible to expand the polygon of laying jointless track with wooden ties. Laying 1 km of jointless track saves over 1,000 rubles a year, 7,000 kw-hrs of electric power or 1 ton of diesel fuel.

The Ministry of Railways insisted on the production of new types of fasteners as far back as 1979. In the decree of the GKNT [State Committee of the Council of Ministers for Science and Technology] of 1979, the USSR Ministry of Ferrous Metallurgy was entrusted with developing and introducing the technology for manufacturing spring rail clips before 1981. By decision of the directive organs, the Ministry of Ferrous Metallurgy was to begin series manufacture of the fasteners in 1984. So far, however, no specialized capacities have been set up for output of high-strength spring rail clips. The deadlines for fulfillment of the assignment of the all-union scientific-technical program have been broken.

The Ministry of the Machine Tool Industry refused to design and manufacture an industrial line to make spring rail clips. The possibility of purchasing an industrial line from the Fosslo firm (FRG) is being considered. UralNIChM worked out the technical assignment for this line and it was turned over to the Ministry of Ferrous Metallurgy. The output of chair plates and metal parts for BPU and D-4u fasteners causes no difficulties.

**Assignment: Develop and introduce the technology to produce and finish full-hardened rails, including straightening along the length, drilling openings, removing the chamfers and cutting the rails at KMK, NTMK and the Azovstal Combine.**

In 1987 the Minsk Machine Tool Building Plant imeni Kirov produced an adjustable series made up of 5 experimental drilling-cutting machine tools, type MP6-1185, and in 1989 started series production of them. Some 20 machine tools for rail-welding trains were manufactured and accepted. The MP6-1185 design is slated for improvement.

The Vitebskiy Tool Grinder Plant has begun to manufacture sets of equipment to solder and grind circular saws equipped with a hard-surfacing alloy.

The Gomelskiy Machine Tool Building Plant imeni Kirov is manufacturing GD-174 abrasive-cutting machine tools.

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**Railway Structures Improvement Program Noted**  
*904H0204A Moscow GUDOK in Russian 13 May 90*  
*p 1*

[Report by S. Prokhorov: "A Bridge in Three Days"]

[Text] Many railroad bridges have been in use for 80 years or more. Their superstructures have been reinforced time and again, but in spite of this, trains have to limit their speed in passing over 75 percent of them.

In order to eliminate these "bottlenecks," the Ministry of Railways decided to prepare a comprehensive program to build and renovate structures up to the year 2000, which should become an integral part of the state program for technical reequipment and modernization of the railroads in the following decade. We report on one such operation today.

In April, the attention of workers in the Track Service of the East Siberian Railroad and transport bridge builders was concentrated on the bridge across the Irkut River in the center of Irkutsk. Its two spans had to be replaced.

"We changed two spans here last year as well," says Valentin Ignatyevich Vasyanovich, chief of the Engineering Structures Department of the Track Service. "We did this in two 'windows'—a span each day. Now we have decided to cope with it in one 'window.' The point is that the right bank of the Irkut is not frozen up. There is an open channel there all winter. And we had to erect an extra temporary support for moving the spans. In order not to do this, we decided to combine both the spans in a tight bundle and move it from the west bank across this unfrozen channel."

The plan for moving the two spans was worked out by the Track Service, and it was carried out by the collective of Bridge Detachment No 31 of Bridge Train 9. The detachment has a great deal of experience on the rivers of Eastern Siberia.

The "window" continued without interruption for exactly 71 hours. Each shift worked for eight hours. But the shift supervisors stayed for another two or three hours to help the next shift keep in rhythm. The work was conducted in a piercing wind, but the bridge builders held out.

V. A. Ivonin, the chief of Bridge Detachment No 31, was here most of this time. I had a conversation with him during his minutes of rest.

"Vladimir Aleksandrovich, is this shock work, this continuous duty for almost three days, your usual work?"

"I would not say so. Our usual work is building new bridges, but this is reconstruction, replacement of the span structures. No it is not usual, it is difficult and very dangerous work. It is easier for us to build a new one than to rehabilitate this old one."

Generally speaking, this kind of work requires long preparation. We have been preparing for practically a year to move these two spans. I want to emphasize that the efficient work on the Irkut bridge is mainly the result of creative cooperation between the Structures Department of the Track Service and the bridge builders.

"I have spoken with the workers and I was pleasantly surprised: many of them have been working in your subunit for 15 or 20 years."

"Yes, we are proud that the backbone of the collective are regular workers and experienced specialists. Here is Petr Vasilyevich Matveyev, an assembler. He is already a pensioner; he has given all his best years to the detachment, and now, despite his age, he took an active part in preparing to move the spans, and he was a big help on these three days. Aleksandr Pozdnyakov, the brigade leader, has a great deal of experience. Assembler Aleksandr Kobelev also has been working for many years..."

"But the residents of Irkutsk know little about your bridge detachment, for some reason."

"Our collective is 40 years old. We build bridges. One of them, a modern multitrack bridge across the Angara River, is well known to Irkutsk residents. We also built a bridge across the Irkut. On the Cheremkhovo-Rassokha section we put up seven rail bridges across the Irkut near Shelekhov, across the Kitoy, Belaya, and other rivers. We took part in building the northern section of the Baykal-Amur Mainline: we erected a railroad bridge across the Verkhnyaya Angara and a number of others between Novyy Uoyan and Severobaykalsk."

We are also working with our neighbors in Krasnoyarsk Kray. There we changed 88-meter spans in Kansk and worked on second tracks on the Tayshet-Abakan line.

Obviously, we need not discuss all the technical innovations utilized on the bridge across the Irkut in this article. Let the specialists do this. But this is what I would like to draw your attention to. The superstructures of bridges have been replaced for many years on the East Siberian Railroad. V. Vasyanovich, the chief of the Engineering Structures Department, has done a great deal for this. He has surrounded himself with creative people who have also become the "brain center" in renovating old structures and building new ones.

The department's collective has accumulated valuable experience which makes it possible to economize on the "window" time needed to replace a span structure. Thanks to efficient work organization, the time set aside



for "windows" on the railroad is significantly less than the time used on other mainlines for the same operations.

So two 132-meter spans across the Irkut were replaced in 71 hours, saving 500,000 rubles.

I don't think any comment is necessary.

### **Khabarovsk Rail Institute Celebrates 50 Years**

904H0204B Moscow GUDOK in Russian 13 May 90  
p 4

[Unattributed article: "Welcome to the Khabarovsk Institute of Railroad Transport Engineers!"]

[Text] We are a half century old!

Over these years we have trained more than 30,000 specialists for the country's rail mainlines, construction projects, planning and scientific research institutes, and other organizations.

We and our branch in Chita and training and consultation centers in Tynda, Svobodnyy, Ussuriysk and Yuzhno-Sakhalinsk have everything at our disposal to train high-quality specialists.

There are 10 departments, 48 chairs, 100 laboratories and special rooms, two modern computer centers, and the largest scientific and technical library in the kray—all this is the Khabarovsk Institute of Railroad Transport Engineers.

Year after year, our educational institution is equipped with the most up-to-date facilities for training transport specialists.

Four well-equipped dormitories, a dining room, snack bars, a sports complex with a pool, a club, and a polyclinic provide for the students' needs.

Our institute is your path to prestigious vocations, earnings, and prosperity.

We invite working youth and graduates of tekhnikums, PTU [vocational and technical schools], and secondary schools to take part in the competitive examinations this year.

We wish you success!

Studies in the Mechanics Department will not only enable you to become a skilled mechanical engineer, but to acquire a profession that is needed critically. The department trains specialists in two areas—railcar rolling stock and materials-handling, construction, and track machinery. During their training here, students will become proficient in the work specialties of a welder, a lathe operator, a milling machine operator, and a fitter, and the students in the "SDM" [construction and track machinery] specialties will be given automotive training and acquire the right to operate a motor vehicle.

In the department's advanced classes, training is provided in the disciplines of specialties and specialized areas. Production practice is provided at the most advanced and up-to-date enterprises, including the Ussuriysk Refrigerator Car Depot, one of the best in the sector, and the PKTB [Planning and Design Technological Base] of the KhabIIZhT [Khabarovsk Institute of Railroad Transport Engineers], a leader in the field of engineering heavy track machinery.

Beginning with their first classes, the mechanical engineering students take part in scientific research work and planning and design studies in the mechanization of track operations and the development of new railcar designs. The department's students also have been taking part in the development of disk brakes for railcars and the design and production of component assembly machinery which is used throughout the country and abroad. We invite you to join them!

If you want to manage transport processes or become a specialist in bookkeeping and the control and analysis of economic activity in rail transport, come to the "Transport Processes Management" Department, where these two specialties are available.

Students in both specialties here not only will acquire theoretical knowledge in a broad range of general scientific and specialized disciplines, but practical skills in working with computer hardware and computers. Participation in the students' scientific society will enable them to conduct independent research on important technical and economic problems.

The range of activity of an engineer engaged in transport organization and management in railroad transport today is extremely diversified—from organizing train traffic to working out engineering solutions and introducing them. Following the shift to the new forms of economic operation, bookkeeping employees and economists have been required to perfect the forms and methods of accounting and introducing computers and ASU [automated control systems], and they have had to conduct thorough analytical work on the involvement of production reserves in economic activity and the introduction of advanced forms of organizing production and wages. Experienced instructors will help you to master all these mysteries in our department.

The "Railroad Construction" Department was among the first to open the doors for students of the KhabIIZhT a half century ago. Since then, thousands of graduates with the entry "railway construction engineer" on their diploma have replenished the railroad and construction enterprises of Eastern Siberia, the Transbaykal, and the Far East.

In the first and second years, the department's students study general engineering and general scientific disciplines—chemistry, physics, theoretical mechanics, and the strength of materials, as well as engineering geodesy. Beginning in the third year, railway track, the surveying

and planning of railroads, production management, and many other disciplines are added to the list.

The department has everything necessary at its disposal to provide for high-quality instruction of the specialists. Personal computers and various types of computers are being introduced more and more extensively in the training. During the semesters, certain studies are conducted in the branches of the subfaculties established at base enterprises. Many persons are taking part in the work of scientific study groups and in research being conducted by scientific associates for production needs.

The department is renowned for its student construction detachments, its athletic teams, and its amateur talent collectives. It is waiting for you, applicants!

Do you want to become a scientist? Do you love art and are you attracted by the mysteries of architecture? Do you want to see the fruits of your labor right away? All these dreams can be materialized in the **"Industrial and Civil Construction" Department**. A students' scientific society, laboratories, computers, and the help of skilled scientific supervisors are available here for future construction specialists. Our scientists work on the solution of major problems involving the economics of construction, new technologies, the removal of industrial waste, and the supply of pure "spring" water for cities.

After studying disciplines related to structural calculation and architectural design, you will be able to test your efforts in the students' planning and design bureau by developing real projects. Ones such as the athletic gymnasium, pool, and students' dining room that have already been built at the institute. But we do not design just for ourselves. The students' bureau is literally overloaded with orders from other organizations. These include orders for stadiums and hospitals, houses, and even circuses and zoos.

Our department also trains specialists in water supply, drainage and the efficient use of water resources, and the design and construction of bridges and tunnels. There is always a shortage in these specialties. For this reason, a skilled structural engineer will be welcomed in any part of the country.

The collective of the **Electrical Engineering Department** has the task of training an engineer with broad specialization who is professionally mobile and who is capable of adapting quickly under conditions in which equipment and technology are continually improved. The unity of training and advanced scientific and engineering work form the basis of the system here.

The department trains engineers in two specialties: "Locomotives" and "Electric Power Supply for Transport." During their training, the students acquire practical and theoretical skills in electronics, automation, the management and economics of enterprises, industrial safety, and ecology. Branches of special subfaculties in organizations and institutions and combined educational-scientific-production complexes form a link

between enterprises and the department, providing the specialists with continuous vocational training. For example, the cycle of laboratory work on the technology for repairing electric locomotives has already been passed on to the shops of the Khabarovsk-2 Locomotive Depot.

After completing the institute, the department's graduates work at power engineering enterprises in railroad transport, diesel and electric locomotive repair plants and depots, in metros, in planning institutes, and at industrial enterprises and construction sites in the country. If you want to have a wide selection, come to the Electrical Engineering Department!

Every year dozens of graduates of the **"Automation, Remote Control and Communications" Department** come to the signaling, communications, and computer subdivisions, to scientific research laboratories and institutes, and to planning and design bureaus for automated control systems. Vocational training is provided in two specialties here—"Automation and Remote Control" and "Data Transmission Systems"; several more specialties are being planned for the near future, including "Microprocessor Data Management Systems" and "Microelectronic Traffic Safety Systems."

The department has extensive experience in intensive special-purpose training of specialists under contract with enterprises. This system is aimed at training specialists capable of adapting quickly to the conditions of specific production facilities and providing them with computerization and automation.

We have everything necessary for effective training of the students and their scientific and technical creativity. Lecture halls equipped with various types of technical training devices, specialized laboratories for automation and remote control elements and systems, electronic devices, the theoretical bases of transport communications, the transmission of digital information, and multichannel communications, and other facilities are provided for the future specialists.

We invite those who want to acquire a specialty aimed at the future to come to our department!

The **Continuous Training Department** is called upon to help those who cannot or do not wish to leave production work to continue their education. There are training and consultation centers in the cities of Tynda, Svobodnyy, Ussuriysk and Yuzhno-Sakhalinsk to train and assist correspondence students and a branch of the correspondence department is operating in Chita.

Mobile laboratory railcars, which are sent to major stations on the Far Eastern, Transbaykal, and Baykal-Amur Railroads, have been used in the training process for nearly 10 years. Students conduct laboratory work in the mobile laboratories in disciplines such as construction materials, hydraulics, computers, geology, metal technology, and the theory of machines and machinery. Lectures and consultations are given, laboratory work is

provided, and tests and examinations are given at the UKP [training and consultation centers] and in the laboratory railcars by the institute's staff instructors and leading railroad transport specialists.

Entrance examinations for correspondence study are held not only in Khabarovsk, but in all the UKP's and at the branch. The examinations are held twice, in July and September. Preparatory courses are provided to assist those coming to all the UKP's.

Graduating students who have been working in a specialty chosen in a VUZ or related school and have no less than 6 months of work experience in this specialty are given preference in admission to the institute. Persons who have an appropriate specialized secondary education in the specialty selected and who have worked in the specialty acquired for no less than 1 year are admitted without examinations in accordance with the results of an interview.

If you think that your knowledge is inadequate to continue studies or if you have forgotten some of your school work during service in the army, do not despair. The **Pre-VUZ Preparation Department**, which has a preparatory department with day, evening, and correspondence forms of training, preparatory courses requiring payment, an industrial training complex, and engineering classes, will help you.

Daytime students of the preparatory department are provided with stipends, dormitory accommodations, and uniforms without charge. Leading workers who have no less than two years' experience in practical work at an enterprise and uninterrupted service in the past year may become students in the preparatory department. Servicemen who have been transferred to the reserve during the spring are accepted for training with a shorter period of instruction.

Daytime training is provided for 8 months, and evening and correspondence training is nine months in duration. Classes in the evening and correspondence groups begin on 1 November, and the daytime classes begin on 1 December.

Senior students at the training and consultation centers study the following: computer programming, the assembly of electronic devices, the assembly of communications devices, the assembly of power circuits, and other areas.

Beginning in 1990, engineering classes have been organized at the institute in which upperclassmen master secondary school skills and familiarize themselves with basic railroad specialties under the guidance of VUZ instructors.

### New Steam Locomotives Planned

904H0195A Moscow GUDOK in Russian 28 Apr 90 p 1

[Article by GUDOK correspondent A. Mudrakov: "Onward, to the Steam Engine!"]

[Text] Kharkov—Under fading apricot blossoms in the quiet yard of a private home, I had occasion to become acquainted with a person who appeared at first to be a dreamer, an eccentric. These days he is working on new designs for steam locomotives.

A dozen meters beyond the rickety fence, powerful diesel engines are howling insistently and a railroad line with all its electric wires and power cables is not far away... Sergey Mitrofanovich Kutsenko takes a heavy volume from a shelf and quotes the words of Mendeleyev: "It is cheaper for mankind to burn banknotes in a furnace than liquid fuel." The decline of the era of liquid fuel has already begun, but the overwhelming majority of vehicles are powered by internal combustion engines. Kutsenko is suggesting steam engines as a way out of the situation that has developed, for the railroads at least. Especially steam engines which can store up the excessive steam which is discharged into the atmosphere from other sources.

Sergey Mitrofanovich is a doctor of technical sciences, Honored Scientist of the USSR, and a consultant and professor at the Kharkov Polytechnical Institute. He was raised in the family of a locomotive engineer and began his working life at the Kharkov Steam Engine Plant. He is now a scientist with a world reputation who has produced over a hundred scientific works and licensed 20 inventions.

I confess that Sergey Mitrofanovich convinced me of the need to revive the engines which operate on solid fuel. But I could not assume that these times were so near at hand until I visited the Department of Locomotive Building at the KhPI [Kharkov Polytechnical Institute]. A group of scientists here headed by Kutsenko's student V. Kovalev is finishing up the plan for a steam locomotive to be turned over for production. I even managed to see a drawing of the future locomotive, whose dimensions and external configuration resemble the TGM6 series diesel locomotive, but with a cab that is positioned in the center for circumferential vision and a steam engine instead of a diesel. The inscription under the drawing was a pleasure to the eye: an ideal switching engine that is ecologically clean, has good fire safety, and is economically efficient.

The customer for the new locomotive is the Ministry of Metallurgy. The Lyudinovo Diesel Engine Plant and the Kharkov Polytechnical Institute and Giprostal [State Scientific Research and Planning Institute of the Metallurgical Industry] are filling the order. In particular, the latter has studied the energy-producing capabilities of metallurgical enterprises and has identified the places where there is an excess of heat discharges. With the use of waste heat boilers, energy can be obtained free of charge—secondary steam to fuel steam locomotives.

The engine has been named the "accumulator switching engine"; it is one of a generation of "strange steam engines" that were once used, but which turned out to be

forgotten. The power plant consists of a heat-steam-water accumulator (the source of the steam) and a steam engine (the converter). The designers—a group of six persons led by V. Kovalev—made extensive use of assemblies and machinery in series diesel engines: the underframe, transmissions, the main frame, the cab, and other components. It is a completely modern engine. The solutions of the KhPI associates have made it possible to substantially simplify the process of charging the locomotive with any kind of steam and to allow time to service it in the same way as a diesel engine. The steam engine is intended to operate for eight hours under the conditions in which the TGM6 operates, and its traction performance is as good as that of the diesel engine.

Old railwaymen also are familiar with one advantage of the steam engine, almost the main one: the steam engine requires no repair for decades.

About 870 steam locomotives will be standing on plant tracks in the coming years. The Ministry of Metallurgy estimates that the annual economic gain in the sector from this will amount to 34.5 million rubles. The capital investments will be recovered in less than four years.

Has Kutsenko's dream begun to be realized? Perhaps. Solution of the Ministry of Railways' problems and normalization of the mainlines' economy have been given priority in the plans of this descendant of railwaymen. For example, in the Far North, the Far East, and on the BAM [Baykal-Amur Mainline], it is advantageous to transport coal with steam locomotives. In the early 1980's, Kutsenko and his students worked out several versions of steam and gas-turbine locomotives to operate with solid fuel, but the Ministry of Railways showed no interest in the innovations. The work was shelved. They told the designers that the ministry is not worried about the consumption of liquid fuel. But at that time no one could predict that a time of cost accounting would begin in which the railroads would consume only what they have earned.

Now, when accounting is done right down to the ruble, it is interesting to learn that one diesel locomotive consumes 140 to 200 tons of light petroleum products per year. Indeed, we have to be reminded that it discharges up to 14 tons of toxic substances into the air at the same time. But the reliability, durability, and low cost of steam locomotives is perfectly obvious.

#### **Railroaders' Work at Baykonur Space Center Noted**

904H0195B Moscow GUDOK in Russian 28 Apr 90 p 4

[Article by V. Martynov: "The Spaceport Stations"]

[Text] Baykonur Spaceport—Imagine the boundless, sun-baked steppe of Kazakhstan, where the mercury rises to more than 50 degrees Celsius at the height of summer. Cracked and sparsely overgrown with camel's thorn, the tumbleweed familiar from childhood and the occasional elm. A train is approaching the Tyuratam station, and

suddenly, like a mirage in the desert, an oasis-city arises before your eyes, a green island on the bank of the Syrdarya with the familiar standard five- and nine-story buildings, a television tower, and buses on the streets...

After a thorough check of your documents, you enter Leninsk—the center for the Baykonur Spaceport. This is where the asphalt and steel tracks start out for the launch complexes, where the passenger consists commonly called motorized railcars take thousands of passengers to the pads where the journeys into the universe are begun.

The city and the spaceport are 35 years old. The streets and squares here are named after cosmonauts, designers, scientists, and builders, and monuments have been erected in their honor. But the main point of interest in the city center, where newlyweds come on their wedding day to lay flowers, is the actual spaceship "Soyuz."

The tulips bloom in April, as if on order, by the Cosmonautics Day holiday on the Kzyl-Orda steppe. They present them to the cosmonauts, to guests of the city, and to each other. The city residents associate their dreams and hopes for regeneration in our life with them; richly colored and unique on the steppe, they bloom for just two weeks. There are quite a few signs of what is new: the city, which was closed to the majority of people until quite recently, is being visited by persons from many cities in the country and by foreign delegations, presidents and journalists, businessmen and public figures. In May, at the initiative of the spaceport political department, an open All-union amateur song festival will be held here for the first time, under the motto "Join hands, friends!"

Signs of the new. The principal one, perhaps, is the construction not only of launch complexes, but housing, hotels, and administrative and social institutions. The city is growing and being developed. And the railroad for the spaceport is developing along with it: more than 20 stations and somewhat fewer passenger trains to carry over 4 million passengers each year, almost 500 kilometers of steel track, and dozens of locomotives. And hundreds of the persons who perform the railroad's work—first-class locomotive engineers, track and railcar workers, and dispatchers, working in one team with the space researchers.

We are riding in the cab of a new orange diesel locomotive to the place where the first cosmonaut was launched. The names of the stations flash by: Gorodskaya, Moskovskaya, Severnaya. Engineer Orysbay Daulbayev has learned this route so well in 20 years that he can almost drive the train with his eyes closed. He has many trips to his credit related to the transportation of spaceships to the launch pads. Just as quite a few in the active group of engineers have: S. Chernopyatov, B. Metik, V. Samodurov, Yu. Grintsov, S. Kalimbekov, D. Yerniyazov, K. Ispanov, F. Khametshin, T. Zhaksalykov, and Zh. Baygabylov.

New diesel locomotives were received to haul out the "Energiya" booster rocket. They are taking people to

work and back home in the new compartmented (Ammendorf) railcars. All this is a noteworthy fact. But the spaceport locomotive engineers themselves are experiencing a shortage of concern about them, not to mention the shortages in their everyday lives, whether it is the purchase of a washing machine and the detergent for it, a refrigerator, or many other things.

The Baykonur railwaymen spoke bitterly about the fact that they are "unrelated children with two mothers." Being attached to the Kazalinsk Locomotive Depot, they are subordinate under contract to the client, who governs them at his own discretion. True, the engineers do not resent the housing. But everything else?

Yuriy Fedorovich Grintsov, who brought the "Energiya" with the "Buran" to the launch pad, complained that he could not buy a can of stewed meat at his work; you have your ORS [Department of Workers Supply] on the railroad, and you buy right there, he said. But they tell us at the depot: ask the client, you don't belong to us.

Grintsov has been working at the spaceport for 30 years and will retire soon. However, no one is planning to see him or the others off to a well-deserved rest with honors. It is not done. Practically none of the engineers with many years of service have been awarded the "Honored Railwayman" badge, "Labor Veteran" medals, or other decorations. After the cosmonauts return to earth, all those who took part in the launch, except us, are traditionally invited to meet them, they complained. "After the launch of 'Energiya' and 'Buran,' for example, many persons were given an incentive, but they didn't remember us then or on Railway Workers Day. This is the nature of things."

We were sitting with Yuriy Fedorovich at home when his father-in-law, former engineer Aleksandr Alekseyevich Karnaushkin, dropped in. He is 77 years old. He worked on the railroad for 42 years, 30 of them here at the spaceport, without a single reprimand. In 1983, the documents awarding him the "Honored Railwayman" badge were sent to the railroad administration, but they appear to have vanished into thin air.

He recalls those days when he met Gagarin and other cosmonauts, and when S. Korolev and Marshal M. Nedelin jumped into the locomotive cab to get warm on the cold winter days at the launch pad. He can tell a great deal. However, they have forgotten about him as well. Although his immediate superior, the spaceport's railroad department, is a few steps away, down the road.

At the political department, I asked V. Yeliseyev, the deputy chief, why the engineers have been deprived of attention. Vasily Iosifovich had the same view as Senior Instructor Yershov and Maystrenko, a department employee:

"This is a serious omission by both sides: by the railwaymen and by us. In the pursuit of gross output, we have forgotten about the person."

In the place where Gagarin and other cosmonauts were launched I was given the opportunity to visit the space museum named after the first cosmonaut. The guide provided an exciting, stirring account. There were dozens of comments with the autographs of the cosmonauts themselves, presidents, and representatives of foreign and Soviet delegations. I was amazed to learn that my engineer acquaintances and many spaceport employees and residents of the city have been deprived of the opportunity to visit the museum thus far. Perhaps it is because you come out of it with the conviction that the path into space is not a level highway, but a road with ruts where there are all kinds of extreme situations. But the main point, you see, is that the achievements of cosmonautics would prove to be very useful in our unbalanced national economy.

We going toward the place where Yu. Gagarin was launched, but the train ahead of us turned at some distance toward the place where the booster rocket "Energiya" is housed. More precisely, toward the MIK—the assembly and testing building—where the rocket is tested on stands and prepared for launch. On that very day when my engineer acquaintances have to mobilize all their experience, will, and self-control to bring the rocket with precision to the launch pad, to the zero marker. The best experts are attending to the anniversary work.

The city and the spaceport are celebrating their 35th anniversary. Nauruz, which has spread in a broad and brilliant wave throughout Central Asia after many years of oblivion, has taken the form of a colorful spectacle at the Tyuratam station. The dispatchers, railcar and track workers, and locomotive engineers have been preparing for it...

**From the editorial staff:** GUDOK reported from the Baykonur Spaceport two years ago on the lack of attention to railroad workers both from the managers of the special-purpose track and the administration of the West Kazakhstan Railroad. Nothing has changed since then. Perhaps now they and others will finally turn their eyes toward the hard work of the spaceport locomotive engineers and evaluate them at their true worth? Let us hope so.

#### **Mathematical Model Aids Railway Operations** *904H0214A Moscow GUDOK in Russian 29 May 90* *pp 1-2]*

[Interview with Mikhail Leonidovich Dekanyuk, manager of the All-Union Railroad Transport Scientific Research Institute's railcar flow and railcar pool regulation laboratory, by Ye. Khrakovskiy; date and place not given]

[Text] During ministry and railroad selective operational investigations and meetings and during Ministry of Railways Collegium sessions, you very often hear: "They disrupted the empties disposition list for gondola cars. In the Donbass (Kuzbass or Karaganda), there is nothing to

load coal into. Punish the guilty ones...." And they punish them. On the railroads, it is difficult to find a higher ranking traffic commander who has not been punished—as it is written in the orders—"for violating empties disposition discipline."

How are the quotas determined for whose non-fulfillment they whip the managers so? I have heard complaints many times from railroad directors that the Transport Main Administration piles such norms into the technical plan and additional quotas so that one can always demand: "The railroad has more than enough resources. Why are you not providing the empties in the empty disposition list?" However, these resources exist only on paper. The railroad commanders are frequently guilty without guilt.

With what can one counter this practice? Our conversation with Mikhail Leonidovich Dekanyuk, a candidate of technical sciences and manager of the All-Union Railroad Transport Scientific Research Institute's railcar flow and railcar pool regulation laboratory, concerns this.

[Khrakovskiy] I have heard that your laboratory has designed a mathematical model for the network's operational work, which permits various management decisions to be gamed, in particular, regulation tasks to be optimized?

[Dekanyuk] Yes, such a model has been designed and is already being used in a practical manner in the Transport Main Administration. I would remind you that one of the most important tasks in managing the transport process is to insure the dispatching of any product using loading resources. The task of regulating the railcar pool dislocation is a network-wide and optimized one. The criteria can be different. For example, reducing empty runs. There is a body of mathematics for searching out the optimum solution. It can be used practically only through the widespread use of electronic computer equipment capable of operating in the dialogue mode.

The fact is that the technology for managing shipments has a multitude of very diverse restrictions, part of which it is difficult or even impossible to formalize, that is, to describe mathematically. This means that a manager must have the ability to intervene in the search for the best solutions.

[Khrakovskiy] Discussions become more understandable when they are illustrated with concrete examples.

[Dekanyuk] Please. One must always send empty gondola cars from the country's European part to the Kemerovo Railroad and to the Kuzbass. For some, the shortest route lies over the Tselina. However, they also load coal there. The danger exists that it will take the best empty cars for its own loading. It will give all the trash to the Kuzbass.

[Khrakovskiy] Traffic personnel say: It is good for one who is located on the big road of empties.

[Dekanyuk] Here, it would seem that one must disregard the most optimum solution and send empties to the Kuzbass through Isil-Kul and Omsk, avoiding the Tselina mainline. That is why the task of regulating the railcar pool can only be solved in the dialogue mode.

Now, concerning the mathematical model itself. Our railroad network is a large one and one must solve management tasks in an efficient way. It is necessary to disengage oneself. Our model has 1,200 units (Mikhail Leonidovich displays a sheet of Whatman paper on which a diagram of the network is depicted using different colored lines. All divisions are marked in different colors. Inter-railroad junctions are shown by solid black points; inter-division ones—simply by small circles. All classification yards and the main freight stations are singled out. The traffic of the railcar flow is indicated). The computation of the flow of empty and loaded railcars is done for the main types of rolling stock. There are eight of them for dry cargo: gondola cars, box cars, flat-cars, refrigerator cars, etc. For bulk cargo—tank cars for light and dark petroleum products and chemical cargo and hopper cars.

In order to formulate a transport task accurately, one must know how many railcars are being freed where and how many empties are required for loading. In the language of traffic personnel, this is called determining the empties disposition gap. What information is required? First of all, a freight operations plan, that is, a loading and unloading plan, is required. Unfortunately, only the amount each mainline must load on itself and on other railroads is known. In other words, there is a correspondence of railcar flows between railroads. However, one does not know to which station specifically or even to which division this or that cargo will go. We are forced to resort to artificial statistical methods in order to lay out the streams of railcars by divisions.

A checkerboard is compiled based on the information received. The empties disposition gaps for each type of rolling stock are visible on it.

The mathematical model and information base permit an optimum plan to be developed for transferring railcars at junction points. An empties disposition plan fixes the exchange of empties for the railroads.

[Khrakovskiy] Average daily norms for a month are set. However, can the operating situation be changed during this period?

[Dekanyuk] Without a doubt. For example, the load on the Moscow has increased for some reason. This means that it can provide fewer empties for the empties disposition list and that there will be insufficient loading resources somewhere on the railroads. How must one change the empties disposition list in this case?

We have performed a great deal of work with specialists in the Ministry of Railways Main Computer Center (GVTs). They now prepare a diskette (a special carrier of

information) every day on which all the required information concerning the network's operations is recorded. A courier delivers this diskette to the Transport Main administration.

[Khrakovskiy] Is it really possible that one cannot manage without a courier when there is modern electronic equipment?

[Dekanyuk] Of course, it is possible; however, there are still problems with the cable, equipment and interference protection devices. It is a question of equipment; everything will be solved in time. Let us return to our example, the diskette with the data on the state of affairs on the network is inputted into the computer and the manager can game different empties disposition solutions in connection with the mentioned increase in loading on the Moscow Railroad.

When solving operational questions, the dialogue with a computer usually takes no more than an hour. Here, a great deal will depend on the complexity of the task and the qualifications and experience of the specialist. He is not an operator and not a programmer but an individual, who should well understand operating work and know the network, possible alternate routes and freight operations. The computer can do a great deal but it must know how to formulate the tasks facing it and what data to request. The electronic advisor suggests a solution but the manager accepts or rejects it. Not the machine but the individual has the last word.

[Khrakovskiy] How is the dialogue with the computer conducted in practice?

[Dekanyuk] A table showing the transfer of empty railcars between railroads is illuminated on the display. However, the specialist may not agree with this solution since he knows, for example, that it is impossible to transfer an additional 200 railcars at this junction. There can be a multitude of reasons—for example, not enough locomotive crews. A restriction is inputted into the computer and it provides a new version. This is done until the specialist considers a solution acceptable.

One can now press a button and the computer prints out the solution. A telegram with instructions on the changes in the empties disposition plan for specific junctions is signed by the Ministry of Railways directors and is sent to the railroads.

Empties disposition tasks for tomorrow can be solved on a personal computer. However, we recommend doing this for approximately a week. This corresponds to the turnover of a railcar. With a shorter period, it could happen that we run empties in one direction today and, if the situation changes, tomorrow—in the opposite direction.

Of course, empties disposition targets must be met, that is, the railroad should have the necessary rolling stock resources available to it. Our mathematical models have been tested and the information, which arrives from the

Main Computer Center, is sufficiently broad and accurate. We are receiving completely objective solutions with the help of the computer. This is not a strong-willed instrument where the main argument is a blow with a fist on the table. It is a solution which takes the specific situation on the network into consideration.

[Khrakovskiy] Are they making use of all this in the Transport Main Administration?

[Dekanyuk] Unfortunately, not on as broad a scale as one would wish. First, there is still not enough equipment. It is desirable to use faster computers having larger memories. A closer connection with the data bank is also required. Second, it is necessary to improve the qualifications of the personnel and to organize closer mutual relations between the different administration subdepartments.

[Khrakovskiy] Let us return to the empties disposition tasks. What if very sound and thoroughly checked tasks are issued to the railroads and they are not interested in fulfilling them? In striving to exceed the loading plan, they remove transit empties from trips. No persuasion and no reprimands will help. Local interests will prevail.

[Dekanyuk] You have posed, as they now frequently say in jest, a very interesting question? However, it goes far beyond the limits of our work and does not have a direct relationship with the mathematical modeling of transport operations.

[Khrakovskiy] Modeling is not worth a farthing if the railroads disregard the solutions obtained through it.

[Dekanyuk] This task is not a mathematical and not a technical one but an economic and social one. Generally speaking, it is not a private question. Many enterprises must produce products that are not profitable for them. As has now become clear, one must stimulate them economically to do what society needs. An unprofitable product should become profitable if the consumer is interested in it. In my opinion, purely economic levers and some kind of economic sanctions are required in our case in order for the railroads to fulfill empties disposition tasks profitably.

[Khrakovskiy] I do not think that this will help—especially now during the shift to cost accounting and market relations. Will everything push a railroad to load more in order to earn more?

[Dekanyuk] You see, the empties disposition list will be calculated based on a plan compiled with the railroad's participation. This means that it will have empties resources. We are striving to provide optimum solutions; how to stimulate their fulfillment—this is the task of the economists.

In principle, incidentally, one can calculate according to our models the network losses that disruptions in the empties disposition list will cause. In the final analysis, this loss will recoil onto the violators of technological discipline themselves. Our traffic commanders on the



railroads often live from day to day and do not think about where their actions will lead in the future. One should not fail to consider the boomerang effect.

[Khrakovskiy] You said that the network mathematical model, which was designed by you, could be used for more than operating tasks. What else?

[Dekanyuk] I will, perhaps, begin with forecasts for the future. By setting shipment amounts and directions, one can determine all the main indicators of the network's operations—determine where it is necessary to lay new lines and where the carrying capacity of existing ones should be increased.

[Khrakovskiy] However, the accuracy of your calculations will depend on the accuracy of the freight correspondence forecasts. Oh! What a difficult task this is now during the shift to a market!

[Dekanyuk] Using the model, one can obtain not one but several versions. The forecast will not be a simple one; however, it will, nevertheless, prevent one from acting blindly.

[Khrakovskiy] We have been told much about the fact that the railcar pool is insufficient. Some think that if the pool continues to increase without expanding stations, one could paralyze the network, generally speaking. It would be interesting to know what your models indicate in this regard.

[Dekanyuk] Last year, we performed calculations for future plans out to the year 2000 and even to the year 2015. They gave us freight operation forecasts and we determined all the indicators—including, of course, the operating railcar pool—using the model. If the freight traffic forecast is correct, the railcar pool should grow. However, I would not say this for tank cars although the situation here is complicated by the large products list of liquid cargoes and violations of the specialized nature of tank cars.

[Khrakovskiy] What are your models useful for?

[Dekanyuk] They can show you the unexpected—in order to improve the management structure of rail transport. We now have 32 railroads and more than 170 divisions. Is this really the best version. How many of them should there be optimally? The automation of transport management requires the establishment of dispatching centers or okrugs. How many of them will there be and where will they be located? We are trying to solve this task along with specialists in other divisions of the institute and the Ministry of Railways using certain criteria. A final decision has still not been made. However, one is appearing. Evidently, it would be advisable to establish on the order of 45 of these centers. Each of them will be formed on the basis of several present divisions.

[Khrakovskiy] Are technological considerations determining these centers? Or is localism sufficient? Previously, they frequently established railroads and divisions

under the influence of party and soviet agencies. Technologically unsound junctions proliferated.

[Dekanyuk] I find it difficult to reply based on how these centers are being determined. They tell us where it is contemplated to locate them and we, gaming the situation on the model, say what will result from this and what the indicators will be. When selecting the points, they probably consider the presence of qualified personnel, premises and housing and try to have these okrugs more or less equivalent in the amount of work. A multitude of other items are also taken into consideration. As far as I know, approximately 25 of the 45 planned centers have already been firmly determined.

There is another area of application for the innovation. I am confident that our modeling system will interest designers. It has occurred that they did not intelligently know what the effect on the operations of existing railroads and the entire network would be when they built some new line or laid a second track somewhere. The model will permit the gaming of different versions to see what new capabilities are opening up in general. There is no need to convince one of how important it is to present designers a complete picture of the implementation of their solutions. How many unnecessary and irrational expenditures could this save!

[Khrakovskiy] However, an accurate forecast of transport volume is again required.

[Dekanyuk] The trouble that comes from unreliable information is a common one. If we put good data into a model, of course, the solution will be meaningful. If we load garbage into a very modern system, we will receive garbage.

#### **New Railways Institute Rector Appointed**

*904H0196A Moscow GUDOK in Russian 29 Apr 90 p 1*

[Interview with Konstantin Leonidovich Komarov, rector of the Novosibirsk Institute for Rail Transport Engineers, by S. Gracheva; date and place not given]

[Text] Konstantin Leonidovich Komarov has been appointed rector of the Novosibirsk Institute for Rail Transport Engineers by order of the minister of railways. He was elected to this position during a session of the institute's council.

[Gracheva] Pavel Illarionovich Moskalev headed the Novosibirsk Institute for Rail Transport Engineers—the oldest and largest VUZ in Novosibirsk—for 18 years. And now the time had arrived for his departure, as was said in that same order, for scientific pedagogical work. Thanks were expressed to him for his long years of work in transport. His strength, health and nerves, which were “invested” in the rectorship, were not spent in vain. There are 25 doctors of science in the NIIZhT [Scientific Research Institute for Rail Transport] today and the amount of research being conducted, which is aimed basically at solving complicated transport problems, has

reached four million rubles a year expressed in monetary terms. The students, whose number is now 3,500, have also contributed to this.

However, many unsolved social, technical and economic problems still remain. It is necessary to improve training and to re-equip the institute—to introduce personal computers and modern computer equipment. On whom is it necessary to place all this? To whom should one entrust such a complicated facility?

Quite recently, this question would have been resolved in a resolute manner by the selection of a candidate "upstairs." A return to this has seemingly already been planned. Perhaps, it is justified in industry. However, a VUZ is a different category with venerable traditions of electing all positions, except the rector. They decided to violate this tradition in the NIIZhT, entrusting the mission of elections to the institute's highest authority—the VUZ council. All layers of the institute's society, including students, are represented on it.

The task facing the council was not an easy one: select one of the five aspirants. Let us not describe the trouble but let us immediately present the winner. It is Konstantin Leonidovich Komarov, a doctor of technical sciences, professor, and chair of the Physics and Power Department. He is 48 years old and has completed the Novosibirsk State University in the mechanics specialty. In 1964, he arrived at the NIIZhT in the Theoretical Mechanics Department, filling the position of an assistant. Later, he became an assistant professor. In 1970, he defended his candidate's dissertation on the subject "A Dynamic Analysis of Railroad Catenary System Supports." After eight years, he was elected to the position of chair of the Physics Department. In 1985, he defended his doctor's dissertation, which was devoted to questions concerning the dynamic design of plastic structural items. He is the author of 50 scientific works and is the scientific director of the branch laboratory in the Railcars Main Administration. He is a member of the party committee and a deputy to the Zayeltsovskiy Rayon Soviet of Peoples Deputies.

As an eye-witness to the election procedures, I think that Komarov largely won thanks to the students' total support—the institute was papered with placards of the following type: "The NIIZhT needs a new leader, only Komarov himself."

I asked Konstantin Leonidovich: Do you like this militant slogan?

[Komarov] I am pleased that the students have displayed activity. They talk so much now about the passivity of youth and its indifference. There are quite a few examples of this. And suddenly this splash. Of course, it makes one happy....

[Gracheva] And there is this appeal: "Let us replace the apparat with a new one—only together with Komarov."

Or is the trouble not only with Komarov? We usually link our hopes for some renewal with the arrival of a new director.

[Komarov] Renewal is possible if we, the professor and instructor staff and the student body, act together—as is said in this call advanced by the youth.

[Gracheva] Do you have good relations with the students?

[Komarov] I do not believe people who maintain that they have good relations with everyone. Relations cannot be like that with all my 3,500 students. According to the results of a questionnaire among the students, they originally "gave" me 7.2 points out of 9 possible ones. I think that this rating is not a bad one, although there are instructors who have received higher marks.

[Gracheva] Did the students approach the questionnaire objectively?

[Komarov] Those for whom studying is interesting, that is, those who wish to learn, are objective. "Who is who" can be determined at each lecture: the first two-four rows contain those who burn with a desire for knowledge. They can already pass tests in what they have heard. The neutrals move further to the rear. Even further back—in the last rows—are those for whom the selection of a profession is an accident.... The first rows must be taught for five years. Three years plus a year in production would be enough for the others.

[Gracheva] The NIIZhT is one of the largest centers for preparing railroad engineers. During recent years, however, there has been less competition among those wishing to enter here to study. What is the way out?

[Komarov] Unfortunately, this situation is typical of all modern higher schools. There is a multitude of reasons but there are few ways out. I think that the situation can be corrected by the introduction of new modern specialties. Youth is always attracted to the new. In our department, there are robots and mechanical arms and inviolable methods for monitoring dependability and quality.... One must also think ahead of time about the training of university entrants, form the student body basically from railroad school pupils and establish boarding schools for training in the institute.

[Gracheva] However, resources are required for this. Are they always sufficient in VUZ?

[Komarov] One must have a reserve in the form of scientific subunits which can yield a profit. We have such a subunit. It yielded quite a bit of profit last year—more than 800,000 rubles. However, the possibilities are even greater. One must attract practical workers to instructor work and "state acceptance" when defending degree work.

[Gracheva] Thus ended our conversation. To what has been said, it remains to add that Komarov is not only an authority for the students. The instructors also actively

support him, thinking highly of their colleague because of his initiative, enterprise, and boldness of thought and action. They know the cost to him from the fact that an unusually cluttered cellar was transformed into a well equipped office and laboratory and the fact that the Physics and Power Department was the first to move along the path of computerization.

And the last item—concerning continuity. When the NIIZhT was still called NIVIT—the Institute for Military Transport Engineers—its chief was also Komarov. Yes, the father of Konstantin Leonidovich. His mother also worked here all of her life. Thus, the ninth rector must continue his parents' work.

### Supertrain Handling Tested

904H0207A Moscow GUDOK in Russian 17 May 90  
p 2

[Article by V. Verkhoturov, engineer-instructor at the Chita Locomotive Depot: "The Chita Special-Purpose Track"]

[Text] The contradictory statements in newspapers and journals on the coupled, heavy, and other "supertrains" (GUDOK has made its contribution here as well) reflect the sad fact that in our ideologized economic system, practice has ceased to be a criterion for the truth. The truth, not in the highest authority, naturally, is that with the shortage of throughput capacities on lines today, heavy trains are one of the principal methods of increasing the dimensions of transportation. But sometimes the combined trains are formed not to get out of a critical situation, but to fulfill the indicator of average train weight, that is, to increase the bonuses.

Technical progress in transport means carrying more, carrying it faster, and carrying it more cheaply... For this reason, the long-standing search for a way to increase average train weight is continuing. They are attempting to resolve the problems of driving 10,000-ton trains on two lines now—the Transbaykal and Tselina Railroads. On the Transbaykal Railroad, where the layout and configuration of the track is much more complicated and there are large drops in temperature even in one day, they have to resolve many specific problems associated with this. Recently proponents of heavy trains were at the VNIIZhT [All-Union Scientific Research Institute of Rail Transport], where they discussed the test data accumulated in driving the 10,000-ton trains and met with the approval of scientists. Together with a commission of the Ministry of Railways, they received an experimental "SMETradio" [expansion unknown] system, installed on a VL80S electric locomotive, from the VNIIZhT. It makes it possible for the lead electric locomotive to control the second one, which is located in the middle of a consist without a locomotive brigade.

Experimental runs with heavy trains are now being continued by a group of engineers from the Chita Locomotive Depot. They are led by Engineer-Instructor V. Verkhoturov. We are inviting him to discuss some results of the

extensive test work on the Chita Division's special-purpose track which may be useful on other railroads in the system.

For over four years our pioneering group has been conducting traction and braking tests with trains of increased weight and length. These are not purely experiments for us, but a requirement of conditions, because traffic on the railroad is doomed to serious disruptions unless the average weight of trains is increased in the near future.

The weight of a freight train depends primarily on the traction capabilities of the locomotive. A steam engine has pulled 1,600 tons and a diesel engine has pulled twice as much. The length of consists came close to 800 meters about 20 years ago. But the length of the tracks at most stations on the Transbaykal Railroad are still 850 meters. When the powerful electric locomotives made their appearance, it became possible to increase the weight and length of the trains, but the station tracks, with certain exceptions, do not permit us to do that. There is also one more circumstance of no small importance which is directly related to the problems of increasing train weight—the substantial increase in the load-carrying capacity of railcars, not to mention the eight-axle tank cars. We have now begun loading 10 to 15 tons more on gondolas, which makes it possible to shorten the length of heavy consists. But here is the problem—the brakes are less reliable at the same time, which forces us to limit the speed in some cases to 40 kilometers per hour. All this creates problems in driving heavy trains on long downgrades.

It is precisely for this reason that our group is devoting attention mainly to brake operation on the long, steep downgrade between the Turgutuy and Lesnaya stations. This winter we have been working with experimental freight trains weighing up to 10,000-12,000 tons in bitter cold weather, that is, we have been studying brake behavior under extreme conditions. V. Kozubenko, a senior lecturer at the Rostov Institute of Railroad Transport Engineers and candidate of technical sciences, has been taking part in these tests. By using its own methods, our group gradually increased the trains' weight and accumulated important data. This has enabled us to make several small and unusual discoveries and to work out a number of recommendations. I think they will be useful for many railroads.

Our work cannot be fully described in a newspaper article; for this reason, I will mention only one very important feature of the big trains' brake behavior on a long downgrade. It is difficult to control such a train. In order to regulate the speed, you sometimes have to apply braking about 10 or 15 times. And in this situation we identified a very dangerous characteristic of the modern VP-483 type of air distributors. With repeated braking, the brakes are released spontaneously on the rear cars of a long, heavy train. The train cannot reduce speed, and it is clear the kind of serious consequences this can lead to.

I will not describe all the details of the rather complicated process leading to the dangerous effect. I will note briefly that in a train with more than 80 cars, after repeated braking on the downgrade because of the inherent leakiness in the brake cylinders, the leakage of air increases and there is a significant drop in pressure in the brake line between the cars in the front and the rear. As a result, the air distributors come into action automatically and the brakes are released spontaneously.

This dangerous situation could be avoided only in one case—if the time between brakings is increased up to 10 minutes in order to have time to restore pressure completely in the brake line of the last car. But where can we get these 10 minutes on a steep downgrade when the heavy train is rapidly gaining speed? Does it mean that we cannot safely drive such trains through a crossing section? Nothing of the sort—we can, but we need to know how many and what kind of cars should be in the train and what sequence they should be in. In addition, naturally, we must learn how to control the brakes. We have demonstrated this experimentally, making use of all the possible braking conditions, including emergency braking.

We can safely drive trains weighing up to 12,000 tons through a crossing if they consist entirely of loaded eight-axle tank cars with one air distributor. The brakes also function steadily in a consist of gondolas, each of which carries 70 to 72 tons of coal. There can be 90 to 100 cars in such a train, but its weight should not exceed 8,000 tons. The general rule is this: on a long downgrade, the number of cars in a train, not its weight, exerts more influence on braking behavior. There should be no more than 75 cars in the usual combined train.

In addition to the braking tests, we are also conducting traction tests, which have produced good results as well. It was demonstrated, for example, that in a crossing section 32 kilometers long and with a gradient up to the 18,000-ton point, the weight of trains for four-section VL80S electric locomotives, which is restricted by order of the Ministry of Railways to 8,000 tons, can be increased by 600 tons without a decline in traffic safety. Again, the main point is to make up a train either completely of eight-axle tank cars or by putting 35 to 40 eight-axle tank cars at the head of the consist and 50 to 55 four-axle cars after them.

We believe that our pioneering group is working more for the near future. But the results of the experiments can and should be utilized now. It is a pity that we have to encounter various obstacles on this path.

People react differently to changes in their customary life, and to technical progress in general. Some are sick and tired of it. For example, A. Golikov, the chief of our Chita Depot, is not only providing us with support and assistance, but he is eager to drive the experimental heavy trains himself. But certain other supervisors whom I will not name are not very favorably disposed toward the search for ways to increase average train

weight. They think it is useless, because with the shift to the cost accounting "locomotive-hour" indicator it is better to have two consists of 5,000 tons each than one weighing 10,000 tons; after all, for the same amount of work they can "twist out" twice as many locomotive-hours.

Has anyone thought about what the new indicator can become on the path of technical progress? It is no wonder that many engineers at the depot have a negative attitude toward the heavy trains. And others, even if they agree to drive them, on a special schedule. The fact that engineers and dispatchers have a poor understanding of each other's work has an effect here. As much as attempts have been made to bring these two leading vocations closer together and to break down the stereotypes, they are not very compatible, as before. For the present, the result of the experiments and creative research by our group, which is supported by the division management, is a local manual on the organization and driving of trains with increased weight and length. But our work is continuing.

#### Official Cites Moscow Metro Problems

904H0207B Moscow SOVETSKAYA ROSSIYA  
in Russian 11 May 90 Second Edition p 6

[Interview with D. Gayev, first deputy chief of the Moscow Metro, by TASS correspondent V. Solodovnikov for SOVETSKAYA ROSSIYA: "The Capital Metro's Problems: Labyrinths of the Subway"]

[Text] Moscow—When the tenth wave of all kinds of information came down on us with the long-awaited glasnost, it was a report that was accusatory and indignant for the most part that the Moscow Metro, at one time "the best in the world," had found itself in an area of very impartial criticism.

We discuss the current situation in the capital's subway with D. Gayev, first deputy chief of the Moscow Metro.

[Solodovnikov] Dmitriy Vladimirovich, what are the metro's basic problems today?

[Gayev] There are many of them, and I can say with assurance that each one of them is a basic one.

The problem of the metro's technical equipment is extremely critical. For example, the structural shortcomings of the escalators are simply disgraceful. Our industry is turning out escalators at present which are poorly suited for repair work. In this connection, the repair periods are being dragged out for an average of two to three months. It is reassuring that Leningrad's machine builders are promising to develop and begin deliveries of fundamentally new escalators to us by the 1991-1992 period; their design will make it possible to diagnose and correct breakdowns more quickly by replacing defective units with ones in good working order.

We need cars that are more fireproof. It is common knowledge that the cars being used in the metro today can burn up in just 12 minutes. It has now been two years since we asked the chemists to organize the production of fire-resistant glass-fiber phosphalite to line the cars. However, they persist in ignoring these urgent requirements.

We are also concerned about the condition of the trains' electrical equipment. The "Metrovagonmash" Production Association promises to deliver trains to us which have engines that are more fire-resistant and advanced on-board diagnostics by 1992. But in the meantime the engineers are under great psychological pressure because the equipment entrusted to them does not guarantee absolute reliability and safety for passengers in an extreme situation.

[Solodovnikov] The late trains or even the discontinued trains which are so depressing to Muscovites are probably related to the technical breakdowns as well?

[Gayev] Of course. But there are reasons that are no less important. We are alarmed by the fact that persons committing suicide have "chosen" the metro lately. Just since the beginning of the year 12 persons have thrown themselves under the cars to end their lives. As a result, 28 trains were late for a total of 155 minutes and 66 were canceled.

[Solodovnikov] Muscovites and guests in the capital often complain about the low cultural level of metro employees.

[Gayev] The management of the capital metro extends its apologies to everyone who has been offended by our ticket collectors. We cannot condone boorishness in any way, of course, but I will point out that the vocation of AKP [automatic control point] ticket collector is one of the least prestigious. With a very intensive 12-hour workday (up to 10 million passengers pass through the control points every day), their wage is 150 rubles per month. Since more than half of the people using the metro have tickets, the ticket collector must memorize 28 types of them. Young people are not coming into such thankless work.

[Solodovnikov] Do you have personnel problems in general?

[Gayev] As many as you want. We are about 3,000 employees under strength. We are critically short of "mummy" (in job slang, Moscow Metro workers who wash and clean the stations). An attempt to raise their wage to 300 rubles produced no result, since this work has been poorly mechanized. We have a critical need for modern cleaning equipment, which we can obtain only with foreign currency. We have none. In order to earn foreign exchange, we are planning to develop our own commercial service, not associated with any activity. Soviet rubles are needed to develop the metro as well, of course. We have certain positive experience in this area. In just

the past year, we received a rental payment of 1.6 million rubles from the cooperative "flower-sellers" who trade in the metro.

[Solodovnikov] What is your opinion on the rumors about higher metro ticket prices?

[Gayev] There is no decision at this time. But it is a fact that the production cost of a ride on the metro is much higher than what the passengers are paying.

## MARITIME AND RIVER FLEETS

**Maritime Fleet Foreign Trade Statistics Detailed**  
904H0200A Moscow MORSKOY FLOT in Russian No 4, Apr 90 pp 2-4

[Article by A. Kalugin: "Foreign Trade and the USSR Maritime Fleet (A Statistical Survey)"]

[Text] The yearly international trade cargo transport volume of the maritime fleet has now exceeded 3.6 billion tons, which is approximately twice as much as that falling to all other types of transport taken together (not counting pipeline transport). At the same time, the proportion of dry cargo is about 55 percent, and among liquids the main role is played by crude oil, which occupies approximately one-third of the volume of all maritime transport.

USSR international maritime trade in the last few years has constituted approximately 7-8 percent (in tons) of world trade. As for the Soviet transport fleet, which transports both national economic and foreign trade cargoes, its share is scarcely over 4 percent of world tonnage.

According to the data for 1988, the Soviet Union had trade relations with over 140 countries of the world (with most of them—by maritime transport) (Table 1).

**Table 1. Volume of USSR Foreign Trade by Groups of Countries (mill rubles)**

Turnover	1987	1988
Total	128,883.4	132,155.5
With socialist countries	86,320.9	86,258.2
including with CEMA member countries	79,552.0	78,879.2
With industrially developed capitalist countries	28,058.5	30,986.2
With developing countries	14,504.0	14,911.1

An increase was observed in commodity turnover with China (by 25.4 percent) and the Korean People's Democratic Republic (by 30 percent). There was a reduction in trade with Yugoslavia (by 3.5 percent).

USSR Foreign trade turnover with industrially developed capitalist countries increased by 10.4 percent over the 1987 level and constituted 31 billion rubles. With respect to physical volume, it increased by 8.3 percent. At the current prices, export increased by 3.4 percent (with respect to physical volume—by 9.7 percent), and import—by 17.6 percent (physical volume—by 6.9 percent). The relative proportion of this group of countries in USSR foreign trade turnover in 1988 was 23.4 percent (in 1987, 21.8 percent).

The top place in USSR trade with industrially developed capitalist countries was held by the FRG—5.6 billion rubles, Finland—3.7, Japan—3.1, Italy—3.0, France—2.8, Great Britain—2.4, United States—2.1, Switzerland—1.2, Austria—1.2 and Belgium—1.1 billion rubles.

The main partners of the USSR in trade with developing countries in 1988 were India—2.3 billion rubles, Iraq—1.3, Afghanistan—0.7, Egypt—0.6, Argentina—0.6 and Libya—0.5 billion rubles.

The situation in USSR foreign trade changed somewhat in the first half of 1989. Foreign economic activity was carried out within the framework of the essential democratization and simplification of the emergence of enterprises and organizations on the world market. At the end of this period, over 5,000 participants in international trade were registered in the country. At the same time,

the volume of export-import operations constituted about 67 billion rubles. Export supplies remained almost on the level of the corresponding period in 1988 and were estimated at 33.1 billion rubles, and import—34.2 billion rubles (2.3 percent increase). The balance of our country's foreign trade operations with the socialist and developed capitalist countries in the first half of 1989, however, took shape in a negative way.

In January-June 1989, the USSR imported 38 million tons of grain, which was 19 percent more than in the same period in 1988, 306,000 tons of meat and meat products (a 1 percent increase), 159,000 tons of animal fat (8-fold increase) and 515,000 tons of vegetable oil (20 percent increase). Deliveries of fish, coffee, tea, citrus and other food products increased considerably. The delivery of foodstuffs and consumer goods to the USSR was mainly carried out on maritime ships. In the second half of 1989, large above-plan purchases of foodstuffs and consumer goods were made abroad, and they were delivered by the Soviet and chartered fleet, through supplementary orders.

Table 2 represents the basic groups of commodities exported and imported by our country in 1988. It can be seen from it that the leading role in USSR export was played by fuel, electric power, machinery, equipment, ores and metals and in import—by machinery, equipment, food products and industrial consumer goods.

**Table 2. Structure of USSR Export and Import in 1988 by Consolidated Groups of Commodities (in percent)**

Commodities	Export		Import	
	Total	In socialist countries	Total	From socialist countries
Total	100	100	100	100
including:				
Machinery, equipment and means of transport	16.2	19.6	40.9	47.1
Fuel and electric power	42.1	43.6	4.4	2.1
Ores and concentrates, metals and items made from them	9.5	10.1	8.0	4.9
Chemicals, fertilizers and rubber	4.0	4.1	5.0	2.8
Timber, pulp and paper items	3.5	2.6	1.2	0.3
Textile raw material and semimanufactures	1.6	2.0	1.6	0.3
Food items	1.7	1.5	15.8	15.0
Industrial consumer goods	2.8	3.0	12.8	15.9

Ships and ship equipment occupied only 0.2 percent of Soviet export, and in import—2.7 percent. More detailed information on imports to the USSR of ships

and ship equipment from specific countries can be derived from Table 3, from which it can be seen that it increased by 14 percent over 1987.

**Table 3. Import of Ships and Ship Equipment to USSR (thous. rubles)**

Importing country	1987	1988
GDR	440,790	453,254
Finland	213,525	365,062
Poland	301,352	275,509
Yugoslavia	124,379	230,950
Bulgaria	133,946	86,507
Romania	58,021	76,764
Austria	19,603	74,028
Czechoslovakia	74,502	71,054
Hungary	33,909	30,125

Portugal	17,845	17,359
FRG	10,060	10,919
Great Britain	1,835	3,315
Japan	3,820	3,127
Sweden	2,283	2,833
Denmark	2,159	1,536
Netherlands	1,871	483
Total	1,499,449	1,748,347

The physical volume of USSR export and import in 1988 was 522.2 million tons—5 percent more than 1987. It can be seen from Table 4 that 128.8 million tons, or 24.6 percent of the indicated volume falls to pipeline transport.

**Table 4. Transport of USSR Foreign Trade Cargoes by Types of Transport in 1985-1988**

Type of Transport	1985		1986		1987		1988	
	mill.t.	percent	mill.t.	percent	mill.t.	percent	mill.t.	percent
All transport (with pipelines)	458.5	100	479.0	100	495.7	100	522.2	100
including pipe line	108.7	23.7	118.0	24.6	125.3	25.2	128.8	24.6
All types of transport not including pipeline	349.8	100	361.0	100	370.4	100	393.4	100
including:								
sea	231.2	66.1	234.9	65.1	253.0	68.3	276.2	70.2
railroad	104.8	30.0	110.7	30.7	103.6	28.0	104.3	26.5
river	12.2	3.5	13.8	3.8	12.4	3.3	11.5	2.9
motor vehicle and air	1.6	0.4	1.5	0.4	1.4	0.4	1.4*	0.4

\* only motor vehicle transport

All other types of transport in 1988 transported 393.4 million tons of USSR foreign trade cargoes, including 276.2 million tons on maritime ships (under all flags).

In the last few years, a steady trend in the growth of maritime foreign trade transport and a corresponding rise in the share of the maritime fleet among other types of transport has been established. At the same time there is a drop in the relative proportion of railroad and river transport. This is primarily because most of the Soviet Union's trade partners are located across the seas and oceans. In addition, most Soviet export consists of heavy cargo, which it is inefficient to ship by other forms of transport, even with the availability of land services. In import there is also a considerable amount of bulk cargo (for example, grain) and large equipment, the delivery of which by railroad and motor vehicle transport is impossible or inexpedient.

Out of 276.2 million tons of USSR foreign trade cargoes, transported in 1988 on ships under all flags, 144.7 million tons, or 52.4 percent, fell to the share of Soviet shipowners. It can be seen from Table 5 that in the last few years there has been a reduction in the share of the Soviet transport fleet in the country's maritime foreign trade transport. Soviet shipping companies often have a shortage of specialized tonnage on specific transport routes due to the appearance of urgent extra-plan orders from foreign trade organizations. This naturally has to be compensated by chartering ships under foreign flags. In addition, maritime transport between the USSR and a number of foreign countries is regulated by agreements specifying the participation of the partners' fleet in delivering cargo for reciprocal trade. The fact that with the constant growth of the physical volumes of USSR foreign trade, the country's maritime tonnage is scarcely increasing, also has its effect.



**Table 5. Participation of Soviet Maritime Fleet in Transport of USSR Foreign Trade Cargoes and in Cross-Trade in 1985-1988**

	1985	1986	1987	1988
Volume of all USSR foreign trade cargoes, transported on maritime ships under all flags, mill. tons	231.2	234.9	253.0	276.2
including on ships under USSR flag, mill. tons	137.0	149.1	143.2	144.7
Share of Soviet fleet, percent	59.3	63.5	56.6	52.4

Nevertheless, the reduction in the share of the Soviet fleet in maritime transport of USSR foreign trade cargoes does not mean a reduction in the participation of our shipping companies in absolute terms. As can be seen from Table 6, in 1988, 144.7 million tons of USSR

foreign trade cargo was transported on Soviet ships, as against 143.2 million tons in 1987 (1 percent increase), or 56.6 percent of the transport volume in all types of sailing. In coastal trade its share was 30.2 percent, and in cross-trade—13.5 percent.

**Table 6. Transport Volume of Maritime Shipping Companies of the USSR Ministry of the Maritime Fleet in 1985-1988 (mill. tons)**

	1985	1986	1987	1988
Total transport volume	239.7	249.5	251.7	256.9
including:				
foreign trade cargo	137.0	149.1	143.2	144.7
coastal trade	84.4	85.7	82.0	77.5
cross-trade	18.3	14.7	26.5	34.7
Share of cross-trade in total transport volume, percent	7.6	5.9	10.5	13.5

**Table 7. Work of Transport Fleet of Shipping Companies of USSR Maritime Fleet in 1985-1988**

	1985	1986	1987	1988	Changes in 1985-88	
					change	percent percent
Gross transport capacity of fleet, mill. reg. tons	14.7	15.1	15.8*	16.1*	+1.4	+9.5
Deadweight of transport fleet, mill. tons	20.1	20.6	21.6*	22.0*	+1.9	+9.4
Volume of cargo transport, mill. tons	239.7	249.5	251.7	256.9	+17.2	+7.1
including:						
container	9.1	9.6	10.6	12.6	+3.5	+38.4
package	14.9	14.9	15.4	16.3	+1.4	+9.3
Passenger transport, mill. persons	50	51	50	49	-1.0	-2.0
Cargo turnover of transport fleet, bill. ton-miles	489	524	525	544	+55.0	+11.2
Tons of cargo transported per ton of deadweight	11.9	12.1	11.7	11.7	-0.2	-1.6
Cargo turnover per ton of deadweight, thous. ton-miles	24.3	25.4	24.3	24.7	+0.4	+1.6

\*Data at end of year

It can be seen from tables 6 and 7 that in the last few years there has been a gradual increase in the volume of shipments by the USSR transport fleet and an increase in its cargo turnover (in 1985-1988, respectively, by 7.1 and

11.2 percent). The cargo turnover per ton of deadweight in 1987-1988 rose negligibly—by 1.6 percent, and the weight of the cargo transported per ton of deadweight was reduced by 1.6 percent. It should be noted that the

weight of the cargo transported per ton of deadweight on the world transport fleet, according to the data of UNCTAD, is approximately 3-fold less than on the Soviet commercial fleet, but the cargo turnover per ton of deadweight is 8-10 percent lower.

The work of the shipping companies under the new conditions of economic activity contributed to increasing the proportion of cross-trade in the total transport volume of our fleet, from 6-7 percent in 1985-1986 to 13.5 percent in 1988. The volume of container and package transport rose sharply, both because of the fleet's participation in foreign trade and cross-trade transport and the development of container services on all forms of USSR transport.

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**Helicopter-Ship Commercial Operations Analyzed**  
*904H0208A Moscow VODNYY TRANSPORT*  
*in Russian 5 May 90 p 2*

[Article by VODNYY TRANSPORT correspondent A. Mikhasenko: "A 'Commercial Helicopter Carrier': The Problems and Prospects"]

[Text] Vladivostok—A helicopter in the North is what a bus is in the city—the usual means of transportation. The rotary-wing aircraft carry people, help the oil drillers to set up their rigs, help the polar workers to conduct research on the planet's ice cap, and help soldiers to protect the border. But residents of the Chukotka settlement of Sireniki were quite surprised when a freighter was anchored not far from shore, a helicopter took off from the deck, hovered over the open hold, and carried a container on a sling to the shore. Then, like a bird feeding its fledglings, it shuttled back and forth, carrying one "box" after another.

The method of unloading ships by helicopter is no longer an idea or experiment. It was tried out for the first time in the world in 1987 on the diesel-electric ship Vitus Bering. After performance trials in the Black Sea, the first vessel in the new series built by the shipbuilders in Kherson arrived in Vladivostok to operate off the unequipped coastline of Kamchatka, Chukotka, and the Arctic, delivering general cargoes for consumers.

It seemed that the vessel would be warmly welcomed. Its technical performance was impressive. With its imposing dimensions—164 meters long and 23 meters wide, it develops a speed of 17 knots and carries 10,000 tons of cargo. It is equipped with cranes. It has holds for dry and refrigerated cargoes, and an access ramp in the stern makes it possible for vehicles to be loaded under their own power. There is a self-propelled barge on board for cargo operations in bad weather. But the main advantage of the Vitus Bering is its helicopter complex.

Let us add that the ship is capable of transporting liquid and tared GSM [fuels and lubricants], it can operate

independently in 1-meter ice and overcome ice obstructions up to 2.5 meters thick. Indeed, it is a "wonder" for the North. A miracle of technology. Then why have the seagoing professionals regarded this "miracle" so skeptically?

The champagne had not dried out on the bow of the giant icebreaker when a row broke out. The auxiliary diesel generator in the engine room fell apart, in the full sense of the word, on the first voyage. An interdepartmental commission was formed and defective output at a plant was found. A lawsuit was begun between the Far Eastern Shipping Company (the days of layover cost the DVMP [Far Eastern Shipping Company] 10,000 rubles) and the Kherson Shipbuilding Association. The forced delay at anchor enabled the operating personnel to examine the unique vessel more closely (on paper). It turned out that the electrically powered ship had a substantial amount of unfinished structural work. V. Miskov, the chief of the DVMP, described it in detail in a report to the minister of the maritime fleet.

"The cranes are low-power and unreliable. There are no air-cushion platforms, they are in the testing stage. It does not have the K-32 cargo helicopter promised by the aviators. The vessel was known beforehand to be unprofitable because of the huge expense of all the innovations."

They say that everything falls into place in time. It happened that way to some extent. The Vitus Bering underwent refitting and powerful 25-ton cranes capable of operating in pairs made their appearance on the vessel. The shipbuilders had learned their lesson, the Aleksandr Chirikov, Vladimir Arsenyev, Vasilii Golovkin, and Stepan Krashenninnikov slid down the ways, beginning a series of unique vessels. There is no doubt that they cost a vast sum of money—close to 40 million each. And they consistently bring the Far Eastern Shipping Company financial losses—about a million each year. But everything is not so unequivocal.

There was not one accident in the last Arctic navigation season on vessels of the Vitus Bering type. But previously every delivery to a point on shore without facilities involved an accident: barges turned over, persons were crushed by drums and containers, and seamen were soaked up to their waists in icy water, "earning" rheumatism. And V. Miskov is far from being so categorical. Today he is convinced that the seamen's health and normal working conditions are worth any expense. And the economy is not as simple as it appears at first glance. G. Litvinov, the dispatcher for the diesel-electric vessel group, cited several interesting figures. In its work in the North, the Vitus Bering takes the place of four dry cargo ships of the Pioneer type. With the shortage of tonnage, this is important. In 1989, three electrically powered vessels delivered about 14,000 tons of cargo—from needles to tractors—to a shore without facilities. With the series production of the K-32 helicopters, the diesel-electric vessels have begun operating more intensively. Up to 430 tons of cargo per day are being transferred.

The new transport-technology system turned out to be complicated for the customers. It was simpler when a ship stood at anchor for weeks. But now they have become accustomed to seeing cargo come out of the sky like a horn of plenty.

Opponents of the helicopter carriers maintain that delivering tons of cargo from "the Berings" is incredibly expensive. But who has taken into account the cost of delivering those same tons by traditional methods? When diesel vessels wait for favorable ice conditions, then they wait for calm weather...

It would be interesting to look at the detailed economics, an analysis of work by the new series of vessels over a 3-year period. But no one has conducted such research, say scientists at the DNIIMF [Far Eastern Scientific Research Institute of the Maritime Fleet]. But after all, not only the present, but the past history of the emergence of wide-range ice specialists is instructive.

The military were the first to successfully implement the concept of using aircraft on ships. Aircraft carriers became the most powerful weapon of the century. The merchant fleet has not advanced beyond the use of helicopters for ice reconnaissance. Nevertheless, commercial helicopter carriers are the only class of vessels which were developed in the USSR before appearing abroad. For 6 years we took the lead over the Americans, and in 1961 we conducted tests with helicopter unloading (they did this later on the Canadian coast). In 1969 S. Zelmanov, a young scientist at the TsNIIMF [Central Scientific Research Institute of the Maritime Fleet] under the guidance of Professor Dormidontov, wrote his candidate's dissertation, "Design Characteristics of Cargo Helicopter Carriers." But he defended it in a doctoral council of the Leningrad Shipbuilding Institute only after 11 years!

Solomon Vulfovich proudly considers himself one of the godfathers of the helicopter method of cargo handling. But the concept itself, not what developed from it. In his opinion, it turned out to be incidental that "the Berings" can work with helicopters. But he is convinced that they should have been designed from the beginning for the helicopter method. And precisely because the vessels are very expensive. The helicopter has been the main "plus" and the main "minus" of the electrically powered vessels at the same time. Without the rotary-wing aircraft they were inferior to specialized vessels in all respects.

Why did it happen just this way? I do not know the official point of view. But I know that in building the first vessel in the new series, they hardly asked seamen what kind of ship they need.

So can the financial losses be reduced anyway? S. Zelmanov has no doubts about this. He suggests that as much attention as possible be given to the series of vessels—that the equipment be improved, and in particular, that automation of the cargo sling attachment and release be introduced. Maximum use must be made of containers and enlarged cargo areas. After all, aside from

the K-32, there is a helicopter with greater lifting capacity, the Mi-8MT. Finally, "the Berings" need their largest loads in the period between navigation seasons, when they are the most unprofitable.

G. Pikus, the deputy chief of the Far Eastern Shipping Company, has nothing against the scientist's conclusions. On the contrary. Georgiy Ivanovich said that automatic crosspieces (grips) have already been ordered. Container modules will soon make their appearance as well. After the refitting they increased the capacities for helicopter fuel and so forth on the vessels.

Antarctic researchers have become interested in the qualities of the helicopter carriers. Two diesel-electric vessels have already been taking part in experimental voyages to the sixth continent and have proved themselves splendidly. Japanese industrialists are giving very close attention to the vessel. Contracts for chartering are being worked out by firms in India, Bulgaria, and Canada for work in the high latitudes.

Development of a new-generation Arctic fleet will not stop with "the Berings," of course. And the vessels will certainly be even more expensive. A good manager does not grudge money for what is necessary. As long as it is spent wisely.

### Digital Data Exchange Between Ships, Shore Proposed

904H0208B Moscow VODNYY TRANSPORT  
in Russian 12 May 90 p 2

[Article by A. Keystovich, chief of a sector of the Gorkiy Scientific Research Institute of Radio Engineering and candidate of technical sciences: "Figures Instead of Words"]

[Text] The level of process automation control is often used as one of the criteria for evaluating the work of each sector. A great deal of attention is being devoted to automation tasks in the river fleet as well, particularly to improve information on internal waterways and the use of active radar monitoring systems and shore control centers. The problem of regulating vessel traffic to reduce empty runs and to bring about the best possible distribution of vessels on routes, taking their specialization and the cargo being carried into account, is also on the agenda.

In my opinion, these two problems can be resolved at the same time by supplementing the functions of microprocessor systems to process source data and display navigation information with other functions—the acquisition and processing of information for effective control of the fleet's work in accordance with assigned requirements for urgency and reliability of the information received.

The exchange of verbal reports between navigators and dispatchers is being held back by the increase in process automation in the sector. For this reason, it is necessary

to shift to an exchange of digital information, in which data are transmitted, received and processed with the aid of microcomputers.

When the advisability and economic soundness of planning an automated control system for vessel traffic is confirmed, the best possible alternative in setting up the system as a whole is selected in the next stage of development. One of them that may be examined is the structure I have proposed.

The essence of it is as follows. Data are exchanged between vessels and between vessels and shore technical services through navigation-communications complexes with the aid of unified traffic. The shore technical facilities, communications channels, and computer centers are utilized in accordance with their direct purpose. The main volume of operations in processing digital information of all types is transferred to the computers in computer centers. The navigation-communications complexes are set up on vessels, in ports, and in areas of hydraulic structures. These complexes are developed by taking into account the use of ship radars, radio stations, and the like, together with microcomputers. When the system is being planned, different algorithms on the exchange of data between facilities in the sector are tested and the priority directions for the exchange are determined.

The version suggested for setting up an ASU [automated control system] for vessel traffic will make it possible not only to reduce the rate of accidents on internal waterways, but to improve quality and efficiency in managing technical processes in the sector and to obtain a chart of vessel locations in the basin. The use of navigation-communications complexes on vessels and at shore facilities will make it possible to have automated exchange of data among subscribers in the sector, including mobile ones, and thereby close the circuit of automated control in river transport.

This technical solution to supplement the existing equipment may be introduced gradually, without disrupting the functional ties in effect.

#### **Shipbuilding Activity Reported**

904H0229A Leningrad SUDOSTROYENIYE  
in Russian No 4, Apr 90 pp 56-59

[Report prepared by A.N. Khaustov: "At the Shipyards"]

[Text]

#### **Okean Shipyard**

The departure of a ship from the building dock is always a great event. On 30 September of last year, a new ore carrier flew Norwegian and Soviet flags for the first time. After a break of ten years, the yard was again going onto the foreign market: a contract was concluded with the Norwegian firm, Fram Bulk Carriers, to supply two ships to transport bulk cargo. Now the first of them, the Stena

Australica, was ready to leave the dock. On its side was the lettering: "USSR-Norway: Peace, Friendship, Cooperation." Lidiya Kozachenko, senior foreman of the painting-insulating shop, in accordance with tradition, smashed the bottle of champagne against the side. Tugboats slowly led the ship from the dock and drew it to the outfitting quay. At the area in front of the dock, everything is ready to lay the keel of the next sea-going ship.

#### **Baltic Shipyard Production Association**

The prototype roler Kronshtadt is being built for the Baltic Shipping Company under the complex conditions of the conversion and perestroyka of the economic mechanism. The keel of this ship, which uses the horizontal method of cargo processing, was laid on 28 September 1989 at the sloping building berth "A", where sections of the ship taken from the construction site were already rising up. On that day, one more section was added to the 89-ton bottom section, installed the day before. Then, by tradition, in the presence of guests and journalists, the copper keel-laying plate was attached. The new ship, designed at the Baltsudoprojekt Central Design Bureau, is 167 m long, has a displacement of over 23,000 tons, and can transport 1,200 passenger vehicles. Two diesels, each with a power of 4,600 kw, will provide it with a speed of about 18 knots. The crew will be housed in single cabins. Eight rolers of this type are to be built. Launching of the prototype is slated for July 1990.

#### **Kherson Shipbuilding Production Association imeni 60th Anniversary of the Lenin Komsomol**

The diesel-electric ship Stepan Krasheninnikov left for its underway trials in September of last year. This is the last, tenth, ship of the series of all-purpose Arctic supply ships of the Vitus Bering type. The prototype ship was turned over for operation in October 1986. The senior builder of both the first and the last supply ship was V. Kaplenko. His assistants—I. Makarenko, N. Filenko, V. Katurin and V. Rudenko—skillfully solved the problems that arose. Among the creators of the Stepan Krasheninnikov were the experienced shipbuilders of the brigade of P. Zadorozhnyy and many others. Captain A. Marshalov navigated the diesel-electric ship on its first run. Supply ships of the new series will be completed with economical low-speed diesels with direct transmission using VRSh [variable pitch propellers].

#### **Yaroslavl Shipyard**

The yard has been building fishing boats for many years. The next seiner-trawler, the Murom, departed on its first run from the yard's mooring at the beginning of last July. It was the second ship built at Yaroslavl for the Fishing Kolkhoz imeni 21st CPSU Congress, which is located not far from Nakhodka. The first seiner-trawler, the Knevichi, was obtained in 1985. The fishermen catch pilchard, halibut, flounder and pollock. In accepting the Murom, V.I. Tkachuk and V.V. Merzlyakov, the ferrying and fishing captains, noted the good seagoing qualities of

ships of this design and their successful use for all types of fishing. The high-circulation newspaper SUDOSTROITEL reported this.

#### **Sevastopol Shipyard imeni S. Ordzhonikidze Production Association**

After launching the pontoon for a floating crane of the Slava Sevastopol type—the latest of the 500-ton series—the building berth laid the base for a floating crane for the Republic of Cuba. This is a modernized crane with a load-lifting capacity of 150 tons. A new assembly technology was used to form its pontoon. It differs from that previously used in that the three-dimensional hull structures were manufactured and maximally outfitted in the shop, and virtually nothing but the butt-joining was left to do at the building berth. This technology makes it possible to do much of the work in parallel, which reduces the total length of time spent for it. In addition, the level of technical readiness of the pontoon for the moment of launching was considerably increased—up to 60 percent—(instead of the former approximately 40 percent). After four months of work at the building berth, the finished pontoon was launched, and in three months, in December 1989, the new crane was ready to be turned over to the purchaser.

#### **TsNII [Central Scientific Research Institute] imeni Academician A.N. Krylov**

The institute's experimental base and the great experience in research and design work are making it possible to work out efficient designs for high-speed and economical ships with an air chamber at the bottom. The special feature of these ships is the reduction in resistance to movement, plus the fact that only 2-3 percent of the power of the main engines is needed to create the air chamber. The merits of the ships are: stability under shallow-water conditions, the possibility of embarking and disembarking passengers on an unequipped shore, good speed and seaworthy qualities and simplicity and reliability of operation.

#### **Black Sea Shipyard Production Association**

"NEP Yard"—that is the name given to the system worked out in the association for internal cost accounting, the core of which is to tax the profits of the structural subdivisions. The imperfection of the norms for forming the enterprise funds during the first and second models of cost accounting makes it impossible to completely break the expenditure mechanism, inadequate to stimulate a reduction in expenditures for the output of products. While it was formerly up to the shop to establish a firm rate, which it should submit to the common yard till for the reproduction of fixed capital and social development, its collective will be interested in reducing the production cost of the items to the maximum, since the profit obtained above the tax will remain at its disposal. Now, when superficial reserves are being drawn into the matter, the amount of tax is established for the year, and in the future—for the entire five-year plan. Two indicators have been approved for

the shop: the list of work by contractual obligation and the tax on the profit. On this basis, the labor-intensiveness, trade volume and total profit will be taken into consideration in the shop itself. The wage fund is not determined according to the preceding period, but is earned. The old indicators, for accounting, will be deduced according to the results of the economic activity. It has already become clear, in the early stages, that it is now inadvisable for the shops to conceal their reserves. For example, when building trawlers, in one quarter the profit was increased by 15 percent without raising the prices. In the shop manufacturing electrodes, through increasing the output volume and reducing its cost, the increase in profits per worker was about 800 rubles in a year.

As V.I. Lisitskiy, deputy general director of economics for the association, noted in an interview by a correspondent of RABOCHAYA GAZETA, an independent work collective with a top management level should combine two indicators—the state order, placed on a competitive basis and ensuring a benefit for its executor, and the tax on profit (revenue).

#### **Ritm Scientific Production Association**

The NPO is carrying out the sectorial program of development and industrial output of hydraulic cutting machines. The cutting technology of a super-high pressure water jet is becoming particularly important when introducing new nonmetallic and composite materials. Its advantages over other methods of cutting are: absence of areas of thermal influence, smoothness of the surface of the cut, absence of deformity of the material being worked, low noise and absence of environmentally harmful emissions. The first experimental unit with a hydraulic cutting assembly was manufactured on the basis of the Kristall Tpl-2.5 machine. After that, a moving unit with manual control and hydraulic cutting, the Morion machine, with ChPU [digital program control] was developed. Cutting efficiency is increased when an abrasive is added to the water jet. At a pressure of 250 MPa, from a nozzle 0.1-0.3 mm in diameter, the water-abrasive jet is ejected at a speed of 1,000 m/sec. The MABR-250/5 machine, developed for hydroabrasive cutting, is equipped with a hydraulic booster with a productivity of 5 l/min. Practically any materials can be cut with these machines, with high-quality cutting. It is a case for their industrial development.

#### **Feodosiya Production Association imeni 26th CPSU Congress**

The association has called for the gradual transition of calculating-accounting operations to computers at all of the accounting sections. The ASUP division and the functional subdivisions interested in automating routine accounting operations are working out tasks such as "Calculating Labor and Wages," "Calculating Fixed Capital," "Calculating Accounting-Financial Operations," "Calculating Production Expenditures" and

"Calculating Physical Assets" on computers. The development of new equipment and "tying in" the tasks to the conditions of the association—these measures, begun last year, have not all gone smoothly. For example, at first, the control calculations when introducing automated accounting of physical assets revealed up to 1,200 errors in a month. Moreover, in general they were in primary documents, i.e., in the initial data for the computer. Most often, the errors were made in filling out the documents (30 percent), in introducing new products list numbers (35 percent), in directives for orders (28 percent) and in preparing data (3 percent). The association will convert all the accounting calculation to computers in parallel with its routine work.

#### **Chernomorskiy Branch of the TsNIITS [Central Scientific Research Institute of Shipbuilding Technology]**

Among the developments of the branch's specialists are technological outfitting devices for the painting shops and sections for primary working of shipbuilding rolled metal and painting ship structures under the conditions of a building berth or dock. The berths are using units for airless application of paint—the highly productive Sprut type, the medium-productive Skat and Luch type, portable Impuls type and the Botsman type for two-component materials without solvents. The robotized complexes developed for paint treatment of the flat sections, ship doors and covers, and pleasure boats are based on the use of Kontur-002 industrial robots with the Sfera-47 ChPU system.

#### **Oka Navashinskiy Shipyard**

The use of the newest innovations in science and technology is an indispensable condition for production development. Among the innovations introduced at the yard in 1989 are A-1698 automatic machines to weld the hull framing, a coordinate-turret press and an automatic thermoplast machine to manufacture furniture made of polyamide in multiple molds, using the pressure casting method. Flow-position shaping of two building areas of a ship hull in the shop was organized. The forging-pressing shop developed a technology to manufacture all-stamped shackles. Local cleaning works have begun to clean the runoff of the electroplating shop, using mechanical, physical-chemical and biological methods.

#### **Vympel Shipbuilding Production Association**

Under the new conditions of economic activity, inventiveness and efficiency suggestions for production are becoming a real lever for scientific-technical progress. During the first six months of 1989, 98 engineering-technical personnel, workers and employees of the shipyard at Rybinsk proposed various innovations. Of the 233 efficiency suggestions handed in, 120 were used. Ten borrowed inventions were introduced. The total saving was 87,000 rubles. P.A. Iortik, engineer-technologist, was named the best efficiency expert of the year from the results of a city competition. A.A. Sharapov, lathe

turner, and Yu.N. Golubinskiy, senior labor-efficiency clerk, were noted by honorary documents and memorial gifts.

#### **Shipyard imeni 61 Kommunar**

Violation of fire safety rules in production is by no means a rarity. For example, in 1988, 119 of the shipyard workers were fined by the organs of the State Fire Inspectorate, and 161 persons were given warnings. Among the frequent causes of fires are various types of work involving flame on ships being built and repaired. To increase the responsibility for adhering to the rules of fire safety, gas-electric welders and gas cutters at the yard are being issued green ("A"), yellow ("B") and red ("C") control coupons. For producing work involving flame without formal permission, and for violation of the appropriate rules of fire safety or doing unwarranted work, the "A" coupon is withdrawn, the size of the bonus is reduced by 25 percent and a disciplinary punishment is imposed. For a similar repeated violation, the "B" coupon is withdrawn and the bonus is reduced by 50 percent. If the worker is deprived of the "C" coupon, this constitutes grounds for dismissal from work, transfer to lower-paid operations or being fired for consistent violations of the rules of fire safety.

#### **Krasnoye Sormovo Shipyard Production Association**

The problem of improving the housing-everyday conditions for workers of the association remains very acute. The target program "Zhilye" has been worked out to solve it. This year it is planned to put approximately 34,100 square meters of housing into operation. The construction rates are slated to increase. For this, the shop producing building structures is to be renovated, and other subdivisions providing housing construction by the economic method are to be expanded, including the mechanization section. As a result of the renovation, the formation of housing blocks will be carried out by an advanced new method, permitting the construction of apartment houses to be accelerated.

#### **Zaliv Shipyard imeni B.Ye. Butoma**

Until last year there had virtually never been any reduction in staff at the yard. Because of completing the construction of the nuclear-powered LASH-container carrier Sevmorput, and the introduction of cost accounting, the structure and arrangement of the personnel has begun to improve, and new staff schedules have been drawn up. This complex, sometimes painful work, requiring an individual approach, should occur strictly within the framework of the existing laws. The yard has completely broken up the divisions of LASH ship builders and nuclear safety, and the number of the other divisions has been reduced. For example, in 17 subdivisions, 213 persons were subject to cutback, including 146 specialists and office workers. According to the situation on 20 July 1989, of those cut back, 122 workers were resettled at other work places. The problems of extending the labor agreements with the category

of workers who had reached pension age are being solved in accordance with an individual procedure, directly in the work collectives.

#### **Dalzavod imeni 50th Anniversary of the USSR**

A special exhibit is being created at the yard's Museum of Labor Glory, in memory of the victims of unfounded repression. In 1937, almost the entire management, many shop chiefs, construction workers and foremen were arrested on the false accusation of membership in an "organization of saboteurs and Trotsky spies". Among those subject to repression were I.S. Sergeyev, director of the yard, Kotelnikov, chairman of the yard committee, Berdichevskiy, chief engineer, communists I.F. Kolobov, G.G. Kalitayev, and many others. The precise number of yard workers subject to repression is not known. Little could be found out about the former director of Dalzavod. From the data on the order to appoint Ivan Sergeyevich Sergeyev as director: worker at the Baltic Shipyard, chairman of the ispolkom, head of the rayon division of National Education, director of the Baltic Shipyard, awarded the Order of Lenin. Died at the age of 40. Gathering of the documental materials and the memories of eye-witnesses to the tragic events continues.

#### **Leningrad Admiralty Association**

Socialist competition.... Some suggest that it be abolished, and others—that the system of summing up the results be changed in principle. Questioning of the Admiralty workers, carried out through the newspaper *ZA KOMMUNIZM*, showed that most of them are still in favor of the competition. Under the new conditions of socialist competition worked out at the LAO, emphasis has been placed on rivalry between brigades. Three basic directions have been singled out. The first is a competition of the brigades engaged directly in shipbuilding. The second direction encompasses brigades producing consumer goods, as well as items for the agroindustrial complex (competition according to the technological chain—unconditional fulfillment of the plan, steady work pace, quality). The third direction includes competition between brigades and sections for the title of "Best Collective of the Association." The system of summing up the results has been considerably simplified, and the number of indicators has been reduced—only those characterizing production activity, condition of labor safety practices and discipline remain.

#### **Volgograd Shipyard**

The benefits for workers in critical specialties are being expanded at the enterprise. At the end of the first three years of work, lathe turners, lathe and drill operators, millers, pipe benders, toolmakers and grinders who have no violations of labor discipline are paid a one-time benefit of 200 rubles. When going on their annual leave, machine tool workers and toolmakers are allotted a material incentive: with work service from one to 5 years—70-100 rubles (depending on the rank of III-VI), from 5 to 10 years—100-130 rubles, from 10 to 20 years

and 20-30 years—respectively, 130-160 rubles and 160-190 rubles, and over 30 years—190-220 rubles. Qualified worker-tutors are paid a bonus of 40-60 rubles after a student has successfully mastered the program and obtained rank II-III. Other specific measures are provided to secure the personnel.

#### **Perm Kama Shipyard**

The range of subjects which must be discussed by the yard's STK [technical control sector] is a wide one. In the last two years there has been a considerable upsurge in crime in Perm. It was decided to create worker detachments to help the police. Upon the decision of the STK, the shipbuilders will also take part in their formation (on the production-territorial principle). A person who has entered this type of detachment is released from his basic work for a period of at least six months. A special fund, from which each worker is paid at least 300 rubles a month, is being allotted to maintain the detachment.

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#### **Sunken Ship Poses Hazard To Navigation, Environment**

904H0199A Moscow *IZVESTIYA* in Russian 9 May 90  
Morning Edition p 6

[Interview with Pavel Ivanovich Gushchin, production department engineer in the Black Sea State Shipping Company's Novorossiysk emergency rescue, ship salvaging and underwater technical operations group, by Ruslan Ignatyev, *IZVESTIYA* special correspondent; date and place not given]

[Text] Novorossiysk—The catastrophe victim, the Admiral Nakhimov passenger steamship, has already been resting for almost four years on the bottom of Tsemesskaya Bay in the Black Sea not far from Novorossiysk. Several deep water expeditions to the submerged vessel have been organized during this time. The last one was recently. An *IZVESTIYA* correspondent talks with P. Gushchin, a production department engineer in the Black Sea State Shipping Company's Novorossiysk emergency rescue, ship salvaging, and underwater technical operations group, about the unique "operations" that were conducted during these expeditions.

[Ignatyev] Pavel Ivanovich, how many expeditions have visited these submerged vessel and what was their purpose?

[Gushchin] If you are only talking about large ones, there have been three. Each of them had its own purpose. The first one was the most difficult. It was organized immediately after the catastrophe. For three weeks, we had to search on the Admiral Nakhimov and around it for the people, who had died, and bring them to the surface. At the time, rescuers from the different corners of the country and divers from the Black Sea Fleet and other departments linked up. Work went on around the

clock—these were the instructions of G. Aliyev, chairman of the government commission. There was quite a bit of trouble because of the nighttime diving....

[Ignatyev] What do you have in mind?

[Gushchin] The trouble was that the steamship was a very old one. Its shell was plywood. Being underwater, it soaked up the water and became slippery and fragile. As you know, the corridors on a vessel are narrow. Moreover, the Admiral Nakhimov lay on its right side on the bottom; its list was almost 90 degrees. The divers crawled about this eight-deck giant as if through tunnels, in danger of falling through and becoming trapped. A great deal of debris and different types of obstacles were encountered along the way. For example, a fire door weighs approximately 300 kilograms and, at the very least, a jack or crowbar is needed to open it. Even during the day when visibility reached five meters on the vessel during clear weather, divers had a difficult time; they constantly put their lives in danger. Try to conduct a search in pitch darkness. Here, people experienced not only a great physical strain but also a psychological one. Incidentally, several professional divers gave up their profession after this work. Alas, they banned the raising of the bodies only when an accident occurred.

[Ignatyev] What happened?

[Gushchin] During the night of 18-19 September, two divers were lowered from an SS-21 military rescue vessel to the Admiral Nakhimov. One of them, a warrant officer (michman), went inside to examine cabins and the other one remained outside as insurance. The rescuer had to crawl 40-50 meters through the labyrinth to the designated place. At some point in time, he caught on something and tore his diving suit. Along with everything else, he began to be poisoned by carbon dioxide—he did not “ventilate” in time. When the second diver came to help him, he was not able to tear his comrade from the hand rail on which he was caught. From the SS-21, they ordered the safetyman to come up. They had decided that it was better to lose one diver than two. At the same time, they sent a rescue group. It tried to get in from the Admiral Nakhimov's stern because the former path was blocked by the victim who had already lost consciousness. On their way to the opposite side, a massive metal door turned out to be closed although it had been wide open an hour earlier. Something was jamming it. Nothing remained for the rescuers to do except to return above. It was only at seven o'clock in the morning that a third pair was able to bring the warrant officer up. He still had faint signs of life. He died, however, on the way to the base. Another diver drowned during the night. The expedition ended on this. Thus, of the 423 people who died as a result of the catastrophe, 65 people (according to official data) remain on the bottom with the Admiral Nakhimov.

[Ignatyev] Why was it necessary to send a second expedition to the lost ship?

[Gushchin] On the bottom, there are 600 tons of black oil and diesel fuel in the Admiral Nakhimov's tanks. It was necessary to remove it from them. You see, the sea could be contaminated in the event of a rupture. This would inevitably lead to a serious ecological catastrophe. At first, we wanted to make an opening with explosives so that the black oil would fill a special bell by gravity flow and, subsequently, all this would be raised to the surface. However, nothing of the kind occurred. The water temperature during the day was a plus five-six degrees. With such indicators, black oil becomes viscous and it is impossible to pump it out in such a state. We turned to scientists for help. They thought about this problem for almost a complete year and suggested a unique assembly to us. The system, which was developed by them, permitted the black oil “to be mined” very well from the bottom. This equipment was the first of its kind to be developed in the world. Its operating principle is a simple one. Hot water is pumped into the tanks and the heated black oil rises together with it. They separate it on the surface with the help of a separator. When this is done, the freed water again goes to work. That is how we pumped out 300 tons of black oil.

[Ignatyev] And the other 300 tons?

[Gushchin] Unfortunately, we did not manage to remove the remaining black oil. We were only able to clear the tanks located on the vessel's left side. It is practically impossible to get to its right side. One must dig under it, which is very risky, or cut an opening through the entire engine room. This version is also not realistic: It is very difficult to “pass through” the boiler room.

[Ignatyev] What is the way out?

[Gushchin] At the time, we decided to leave the black oil on the steamship and prepare for a third expedition.

[Ignatyev] Why this expedition?

[Gushchin] The Admiral Nakhimov had sunk two miles from the shore in one of the most navigable and deepest places in Tsemesskaya Bay. Here, the depth is 47 meters. Naturally, the sunken steamship presented a serious danger to navigation. Whereas it, at first, lay on its side with a list of almost 90 degrees, the vessel somehow was gradually rightening itself. The next examination of the Admiral Nakhimov showed that the list to the right side was 36 degrees. The steamship was disappearing into the silt with time. Finally, it sank 20 meters into the dirt and evidently came to rest on rock. Its smokestacks and masts stood up. The distance from the water's surface to the highest mast was 12-15 meters. The draught of large Krym-type vessels, which stop at the Novorossiysk port, is 20 meters maximum. Based on Sevastopol hydrographic service requirements, we should make a lane 30 meters deep over the Admiral Nakhimov. This meant that it was necessary to cut off practically the entire upper portion of the vessel. We tried to use plasma arc cutting but it proved to be poor at this large depth. It also turned out that the smokestack and mast bases were a little bit thicker than the designed ones. That is why we



were not able to cope with the mission at first. We again turned to the scientists. With the help of specialists from the Paton Institute, a method was found to cut metal at a large depth. The masts were removed with explosives and then "finished" using oxygen arc cutting. The smokestacks were also sawed down. This unique work also took place for the first time.

[Ignatyev] What is the Admiral Nakhimov's condition today?

[Gushchin] Basically, observations were taken after the end of the third large expedition to the site of the catastrophe. Divers descended repeatedly to the vessel, examined it and monitored the steamship's position on the bottom. A large patch appeared in that area on the water's surface—a thin layer of black oil covered a large expanse. We have tried to determine where the black oil is coming out of the sunken steamship and to seal it. However, the leaks are continuing...

[Ignatyev] Were there any plans for raising the Admiral Nakhimov?

[Gushchin] Yes, such a plan was developed. Subsequently, we gave it up: It was too expensive. The raising of the steamship would have cost approximately 40 million; now, the total has grown even more. Other proposals have also been received. Among them is the building of a distinctive type of sarcophagus. First, they planned to cover the steamship with a thick water-resistant canopy and then make a framework out of old automobile tires above it. All this would be covered with

dirt and rocks. They calculated and concluded that even this would cost a pretty penny—yes, and be unreliable: There is a very strong current (it reaches one and a half meters a second) at that location. The streams of water would quickly wash away the sarcophagus. In a word, this question still remains open. Now, all of the work is "closed?"

[Ignatyev] Meanwhile, the polluting of Tsemesskaya Bay continues?

[Gushchin] Not only that, this area still remains dangerous for navigation. One must cut off the Admiral Nakhimov's boat davits to make it safe. There are only 26 meters between them and the water's surface. Moreover, there are many floating semi-sawed through lines on the steamship. These cables with a diameter of 200-250 millimeters stand in the water like candles. At any moment, they can wind around the propeller of a passing vessel and cause an accident.

[Ignatyev] It seems that it is necessary to organize the next expedition?

[Gushchin] Not one, but several. We have approximately two year's work. If the Black Sea Shipping Company makes the decision, it will be necessary to dive to the stricken steamship many times more. A half-mile danger zone has been created at the site of the Admiral Nakhimov's death and marker and lane devices have been set up. In a word—for guidance.

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